ROYAL GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

Nos. 151-152.] JULY and AUGUST. [1899.

DCLII.—TEA AND COFFEE DISEASES.

(With Plate.)

Brown Blight of Tea.

The "blights" which affect tea in Assam were investigated and described in the *Kew Bulletin* for last year (pp. 105–112). Another and different one has made its appearance in Ceylon, and has been transmitted to Kew for investigation by Mr. J. C. Willis, M.A., F.L.S., Director of the Royal Botanic Gardens.

Director, Royal Botanic Gardens, Peradeniya, Ceylon, to Royal Gardens, Kew.

Royal Botanic Gardens,
Peradeniya, Ceylon,
April 10, 1899.

Sir,

By parcel post this week I send you a tin containing some specimens of a fungus blight which is causing considerable injury to tea in many of the planting districts of Ceylon. It resembles the "grey blight" of Assam (which is also common here) in its action on the leaf, and I have recommended similar measures for its eradication to those used for that pest. The specimens enclosed show the conidial fructification of the fungus, and I am sending them in the hope that you may be able to give me the name of the fungus to enable me to round off my investigations into its ravages and life history. In the event of your publishing any account of this disease, I have to request that the name of the estate mentioned on the specimens be withheld from publication.

Notes upon the disease are given below.

I am, &c.,
(Signed) John C. Willis.

The Director,
Royal Gardens, Kew.

3435—1375—8/99 Wt 92 D & S 29

[Enclosure.]

Specimens from Maskeliya district, 4,000 feet above sea level, sent to Kew. Fructifying specimens pinned. Collected 7th April, 1899.

Disease like grey blight in appearance and effect, but characterised by chocolate-brown colour of fully diseased spots on the leaves attacked. Common in the Central Province.

Shows first on upper side of leaf, and soon afterwards on lower also. Appears as yellowish-brown patches, which rapidly spread and darken to a chocolate or almost black colour, and as they extend their central parts dry up, die, and often fall out if the leaf is roughly shaken. When the leaf is held up to the light, a yellowish band, 1–3 mm. wide, is seen round the infected area, due to the spreading of the mycelium into the still unattacked area of the leaf, which loses its green colour.

Fructifications not often seen ; on the accompanying specimens they show in typical form, as pinkish spots, more or less concentrically grouped. The spores are oval-oblong, unicellular, hyaline. The blight spreads very rapidly, and does much damage. Measures of treatment recommended are the same as for grey blight.

J. C. W.

10th April, 1899.

The specimens were examined by Mr. Massee, the Principal Assistant for Cryptograms in the Herbarium of the Royal Gardens. He furnished the following report :—

The fungus proves to be undescribed, and may be known as *Colletotrichum Camelliæ*.

All the many known species of *Colletotrichum* are parasites, and many are destructive to important economic plants.

Spraying with Bordeaux mixture, or with ammoniacal solution of carbonate of copper has proved effective in checking the spread of other species of *Colletotrichum*, and would probably prove beneficial in the present instance. In spraying plants like the tea, having glabrous leaves, success mainly depends on the fineness of the spray, which should hang like a fog. A coarse spray causes the solution to form drops which roll off the polished surface of the leaves.

In addition to spraying, all diseased leaves should be collected and burned, as *Colletotrichum* is a form-genus (=the conidial condition of an ascigerous fungus), and if the leaves are allowed to fall and remain on the ground under the trees, the higher form of fruit would form on the decaying leaves and inoculate the new leaves the following season.

G. M.

3rd May, 1899.

The following description has now been prepared by Mr. Massee :—

The fungus present on the leaves proves to be a species of *Colletotrichum*, a genus perhaps too closely allied to *Glœosporium*, differing only in the presence of a variable number of coloured

spines being intermixed with the conidiophores. Numerous species belonging to these genera are known as destructive parasites, attacking more especially leaves and fruit.

The leaves of the tea plant are probably infected in the first instance by floating spores settling on their upper surface when damp. The discoloured portion of the leaf corresponds to the range of mycelium in the tissues. Eventually the central portion of the blotch changes to a dull grey colour, and becomes studded with numerous very minute black spots, which are often arranged in irregular circles. These points correspond to the clusters of spores which rupture the epidermis of the leaf and become free on the surface, whence they are washed by rain or carried by wind to other leaves. After the spores are mature, those portions of the leaf on which they are produced become dry and brittle, and are blown about by wind, and as many spores still adhere to such floating fragments, it is not difficult to understand why the disease spreads so quickly when once established in a plantation.

As the species proves to be undescribed, the following diagnosis is given :—

Colletotrichum Camelliæ, *Massee* (sp. nov.) *Maculæ* amphigenæ effuso-indeterminatæ, primo flavo-brunneæ, dein nigrescentes, denique griseo-arescentes, postremo frustulatim deciduæ ac folium perforatum relinquentes. *Acervuli* centro maculæ laxe insidentes, epiphylli. *Conidia* cylindraceo-elongata, continua, utrinque obtusata, hyalina, episporio levi donata, 15–17 × 4–5 μ. *Cystidia* lineari-cuspidata, septata, olivacea, 100–135 × 7–8 μ.

CEYLON. Central Province. On living leaves of *Camellia Thea*.

Preventive measures. Bordeaux mixture has been proved to arrest the spread of disease caused by other species of *Colletotrichum*, as *C. lindemuthianum* on scarlet-runners and French beans, *C. Altheæ*, on hollyhocks, &c., and would probably prove effective in the present instance. Care should be taken to experiment at first with a very dilute solution until its action on the leaves is ascertained.

Diseased leaves should be picked before the spores are mature ; that is, as soon as the first indications of the presence of the fungus are observed. If this practice was universally followed through the infected area, the disease could be readily exterminated.

CENTRAL AMERICAN COFFEE-DISEASE.

This disease has attracted attention for rather more than the last twenty years. But it is, perhaps, only of late that it has attained serious dimensions. Apparently, the first notice is contained in the *Kew Report* for 1876 (p. 21), where it is noticed as "Mancha de hierro" or "Iron stain." Berkeley attributed it to a minute fungus, *Depazea maculosa*, which was the only organism he could find on the diseased leaves. Dr. Ernst, however, in his *Estudios sobre las deformaciones, Enfermededas y enemigos del arbol de Cafe en Venezuela*, Caracas, 1878, was unable to accept this as the cause of the malady :—

"Berkeley opina que la *Depazea* es causa de la 'Mancha de hierro,' sin duda porque las hojas que le fueron remitidas,

vinieron con esta denominacion. No queremos contradecir el aserto de tan respetable autoridad, pero tendremos más adelante ocasion de comprobar que la enfermedad llamada así es generalmente de otro orígen" (p. 17).

He further expressed the opinion that "iron stain" was to be attributed to more than one cause, and that while in some cases it might be due to a fungus, it was generally the work of the "Coffee-leaf Miner," *Cemiostoma coffeellum*. An account of this will be found in the *Kew Bulletin* for 1894 (pp. 130–133).

"Compréndense acaso bajo este nombre tambien otras manchas de aspecto semejante, pero debidas á la vegetacion de un hongo, como se ha dicho más arriba; pero generalmente es la 'Mancha de hierro' el resultado de la presencia de la larva de una pequeña mariposa nocturna, que en la zoología lleva el nombre de *Cemiostoma coffeellum*, Stainton" (p. 17).

This opinion is important as showing that at the date (1878) when it was written the injury done by the fungus was inconsiderable.

What appears to be the same disease was the subject of a note in *Nature* by Dr. Ernst (July 29, 1880, p. 292). He says:— "There appear on the leaves small spots of a lightish green colour, which in two or three days turn brownish." Hence the name of "Iron stain."

Dr. Cooke detected upon these patches a fungus of an entirely different kind, which he described in *Grevillea* (vol. xi., p. 11) as *Stilbum flavidum*. He further discussed the whole subject in the *Journal of the Linnean Society* (*Botany*, vol. xviii., pp. 461–467).

Spegazzini has recently suggested the name of *Pistillaria flavida* for the fungus on the assumption that it belongs to the Basidiomycetes. This view is not, however, supported by a microscopic examination of authentic specimens.

Of late years the ravages of the fungus have assumed more serious dimensions. It has proved very destructive in coffee plantations in Costa Rica, Venezuela, New Grenada, and Guatemala; it is also said to have occurred in some of the West Indian Islands.

The Government of British Central Africa, apparently under the impression that it is the leaf disease of Ceylon (*Hemileia vastatrix*), which it is not, has "temporarily proclaimed" Guatemala and the Central American States generally "to be prohibited countries" for the importation of seeds and plants.

A lengthy correspondence has taken place with the Foreign Office on the subject, of which the following is the most material portion:—

MR. CONSUL-GENERAL JENNER TO FOREIGN OFFICE.

MY LORD, Guatemala, February 7, 1899.

WITH reference to your Lordship's despatch, No. 14, commercial, of the 4th of November, I have the honour to enclose herewith copy of a despatch from Mr. Consul Harrison, enclosing a short report by Mr. H. Pittier on the diseases which have at different times appeared in the coffee plantations in Costa Rica.

The samples of the dried leaves are being sent to your Lordship by parcels post.

I have, &c.,
(Signed) G. JENNER.

The Marquess of Salisbury, K.G.,
&c., &c., &c.

[Enclosure.]

REPORT of Mr. Henri Pittier on the diseases which have at different times appeared in the coffee plantations of Costa Rica.

During the existence of the Instituto Fisico Geografico several coffee diseases were submitted for study to the botanical department.

Firstly, the so-called "Maya," characterised by circular zones of dead tissues on the leaves, black rotten spots on the fruit, and by the subsequent falling off of both. The fungus which causes the destruction of the tissues has been identified independently by two specialists: Messrs. Rolfs, of the Florida State Agricultural College, and Spegazzini, of the "Facultad de Agronomia" of La Plata, with the *Stilbum flavidum*, Cooke (Pistillaria flavida *Spegazz.*).

Secondly, the "Hollin" or "Fumagina," which appears as a kind of a soot covering the leaves of the coffee tree, and which is also a fungus (*Capnodium trichostomum*, Spegazz.); but in this case the fungus is only a secondary symptom, as it grows on a honey-like exudation of an insect (*Coccus*, scale insect, mealy bug) which settles on the tree.

Thirdly, several cases of distinct appearance, one due to the invasion of legions of caterpillars of a moth, the name of which I do not now remember, and others which were ascribed to over-cropping, to rot caused by imperfect drainage, or to the presence of foul wood in the soil.

These last were all more or less localised and disappeared after a time, but the two first are rather common in the neighbourhood of San José, where they re-appear every year with a gradually more epidemic tendency.

However, so far they cannot be said to have assumed a very alarming character, and the majority of the planters have not paid attention to them.

Owing to the excessive drought I have not been able to find any trace of the fungus on the diseased leaves; but these are sure to appear with the first rains in April and May, and if not too late for you, I shall gladly endeavour to obtain some good samples for you.

(Signed) H. PITTIER.

MR. CONSUL HARRISON TO ROYAL GARDENS, KEW.

British Consulate,
San José, Costa Rica,
SIR, February 28, 1899.

IN accordance with a circular I received from Her Majesty's Minister in Central America, I sent His Excellency for despatch to the Royal Botanic Gardens, Kew, some pamphlets and notes on the diseases which have appeared in the coffee trees in this Republic.

I also forwarded some samples of leaves affected by the disease which the Government obtained for me.

I now under separate cover forward you direct some samples of diseased leaves, collected for me by Monsieur Pittier, and two photographs of trees affected. These trees have recovered, but in some instances look sickly.

I send these direct as Monsieur Pittier tells me the less they travel the better, as the fungus is liable to be rubbed off.

I have, &c.,

(Signed) PERCY C. HARRISON.

W. T. Thiselton-Dyer, C.M.G., F.R.S.,
Director, Royal Gardens, Kew.

The leaves are most frequently attacked, and within a short time become dry and fall to the ground, so that the tree is soon completely denuded of foliage. The growing berries also dry up and fall before maturity. New leaves are formed after some months of rest, usually to be again attacked in a similar manner, and after the consecutive loss of foliage for two or three years, the tree dies.

Diseased leaves are at once known by the presence of one—or usually several—more or less circular pale green, then brown, and finally whitish patches, which extend quite through the substance, appearing equally marked on both sides of the leaf. Grouped on these bleached spots, on the upper surface of the leaf, are several clear yellow drum-stick-like bodies standing erect. Each of these bodies, which are only about one-twelfth of an inch high, is a perfect fungus, bearing myriads of reproductive bodies or conidia on its globose head. One or more similar circular bleached spots bearing fungi also often occur on the berries.

On young twigs the bleached spots are elongated, varying from half to one inch in length. If the diseased patch completely girdles the twig, the portion above the wound dies.

Preventive measures.—Those recommended for the arrest of brown tea blight would probably be effective in the present instance also. Cleanliness is of primary importance. It is impossible for the disease to appear unless spores of the fungus are present in the neighbourhood, and the most effective means for reducing this possibility to a minimum is to collect and burn all diseased leaves and fruit that have fallen to the ground. Photographs received from Costa Rica showing coffee trees completely defoliated by the disease also show the fallen leaves lying in heaps under the trees.

Diseased twigs should be removed, otherwise, should sclerotia be formed, and the mycelium become perennial in the tissues, a yearly crop of conidia would be produced.

Description of Figures.

Fig. 1, coffee leaf showing the disease; nat. size. 2, single patch of disease; slightly magn. 3, two specimens of *Stilbum flavidum;* highly magn. 4, coffee berry showing one diseased patch; nat. size. 5, club-shaped conidiophores of the *Stilbum*, bearing conidia; × 400. 6, leaf of tea plant disease; nat. size. 7, section through a pustule of *Colletotrichum Camelliæ; a, a*, conidia; *b*, sterile coloured spines; × 400.

DCLIII.—FLORA OF BRITISH NEW GUINEA.

As announced in the *Bulletin* (1897, p. 112), Sir William MacGregor presented a small collection of dried plants, made by Mr. A. Giulianetti on Mount Scratchley. He has since presented another collection made by the same gentleman and Mr. A. C. English, chiefly in the Vanapa Valley and the Wharton Range.

The collection from Mount Scratchley consists of about 120 species of flowering plants, nine species of ferns, one *Isoetes*, 28 mosses, nine liverworts, and eight lichens. As some 2,500 species of vascular plants (flowering-plants and ferns) have already been recorded from New Guinea, this collection is numerically small; yet, from the great altitude at which most of the plants were found, it is a highly interesting one; and it contains a relatively large number of novelties. It is true that only two new generic types are included among them; but many generic novelties were not expected from such elevations, where the vegetation is of an alpine or temperate character, and largely composed of genera having a wide range.

Beginning with the cellular cryptogams, the lichens are only represented by quite common species. There are two new species —*Trachylejeunia Giulianettii* and *Cololejeunea hirta*—among the liverworts. On the other hand, nearly half of the mosses are new. They belong mostly to genera characteristic of humid mountainous regions within the tropics. Two out of the nine ferns are new, as well as one of the four Selaginellaceæ—*Isoetes neoguineensis*. As will be seen from the following enumeration, the flowering plants present a larger proportion of novelties, to say nothing of those species previously described by other botanists and not known to exist elsewhere. Better specimens of many of the undetermined species would doubtless considerably augment the number here described.

The smaller Vanapa Valley and Wharton Range collection, received in 1898, includes a remarkable new species of *Elæocarpus*—*E. aberrans*—and a new species of *Triplostegia*, a small genus of the Dipsaceæ, previously only known to inhabit the mountains of Northern India and Western China. There is also a considerable number of specimens of *Veronica*, which have all been provisionally referred to *V. Lendenfeldii*, but it is possible that more than one species is concerned. It is an instance of one very variable species, or several very closely allied species. Ferns are relatively numerous, and, though there are two new species of *Davallia*, they are mostly common Malayan types. One of these, *D. lanceolata*, differs widely from all previously described species, in having small lanceolate fronds two to four inches long.

In dealing with a fragment of a flora it is not safe to generalise; but apart from the fact that most of the endemic species belong to genera of wide distribution, their affinities are with those inhabiting the mountains of Celebes and Borneo. Indeed, some of the species are identical, and not known beyond the Archipelago; whilst others, endemic respectively in, say, Kinabalu, Borneo, and Mount Scratchley, British New Guinea, are very closely allied. Specially interesting among the new plants of this

collection are : *Oreomyrrhis linearis*, *Dolianthus vaccinioides*, *Gentiana Macgregorii*, *G. Giulianettii*, *Havilandia papuana*, and *Giulianettia tenuis*. Besides the foregoing, the grasses are particularly interesting botanically; all the species being regarded as new.

Ranunculaceæ.

Ranunculus amerophyllus, *F. Muell. in Trans. Roy. Soc. Victoria*, i. pt. 2., p. 1.

Mount Scratchley, 10000–13000 ft., and Wharton Range, 11100 ft.

Ranunculus sp. *R. lappaceo*, Sm., var. *multiscapo*, Hook. f., affinis.

Wharton Range, 11100 ft.

Violaceæ,

Schuurmansia Henningsii, *K. Schum. Fl. Kais. Wilh. Land*, p. 50.

Neneba, Mount Scratchley, about 4000 ft.

Pittosporaceæ.

Pittosporum berberidoides, *Burkill;* species foliis coriaceis a *P. cornifolio*, A. Cunn., distinguenda, cui forsan affinis sit.

Rami recti, crassiusculi, cortice glabri rufescentes vel ætate cinerascentes, inter foliorum circulos cicatricibus, pedicellorum defectorum signis, notati. *Folia* obovata, admodum coriacea, persistentia, glabra, basi cuneata, apice abrupte cuspidata, $\frac{3}{4}$–$1\frac{1}{4}$ poll. longa, $\frac{1}{2}$–$\frac{3}{4}$ poll. lata, attrita, suavissima, venis numerosissimis conspicuis lateralibus in margine integro rigido conjunctis, primaria in apicem firmum excurrentia; petiolus $\frac{1}{4}$ poll. longus, rigidus. *Pedicelli* uniflori, $\frac{1}{2}$ poll. longi. *Flores* desunt. *Fructus* subglobosus, glaber, 2-carpellaris, rugosus, fuscus, 4 lin. longus, stylo $\frac{1}{2}$ lin. longo. *Semina* matura 2, nigra, $\frac{1}{2}$ lin. longa.

Mount Scratchley, 10000–13000 ft.

The pleasant scent of the leaves is derived from the resin of the canals which accompany the veins. The petiole contains 5 or 7 of these arranged in a crescent, the central ones being very large.

Pittosporum pullifolium, *Burkill;* species ex affinitate *P. bicoloris*, Hook., foliis facile distincta.

Rami juniores parce pubescentes, dein glabescentes et siccitate nigrescentes, crassiusculi. *Folia* coriacea, petiolata, oblanceo-obovata, glabra, siccitate supra purpureo-nigrescentia, infra pallidiora, basi rotundata, apice cuspidata, $1\frac{1}{2}$–2 poll. longa, 7–9 lin. lata, nervo primario conspicuo, nervis lateralibus utrinque 6–8 inter se prope marginem integrum arcuatim conjunctis; petiolus rigidus, 3–4 lin. longus. *Flores* ad apices ramorum in umbellas (in specimine unico nobis communicato 13-floras) dispositi; bracteæ fere glabræ, 2–5 lin. longæ, 1–$1\frac{1}{2}$ lin. latæ; pedicelli pilis

mollibus flavis tecti, 5–6 lin. longi. *Sepala* glabra, bracteis colore et contextu et figura simillima, ovata, acuta, 3 lin. longa, basi crassa quinquenervia. *Petala* distincta, lineari-lanceolata, 5–6 lin. longa, glabra, apice rotundata. *Staminum* filamenta 3 lin. longa, glabra. *Ovarium* pilis fulvis dense tectum, 2 lin. longum, $\frac{2}{3}$ lin. diam., 2-carpellare, placenta utraque 14–15-ovulata ; stylus 2 lin. longus, glaber; stigma bilabiatum, labiis incurvis. *Fructus* deest.

Mount Scratchley, 10000–13000 ft.

Hypericaceæ.

Hypericum Macgregorii, *F. Muell. in Trans. Roy. Soc. Victoria*, i. pt. 2., p. 2.

Mount Scratchley, 12200 ft.

Ternstrœmiaceæ.

Trematanthera sp.

Mount Scratchley, 10000–13000 ft.

Saurauja rufa, *Burkill ; S. bifidæ*, Warb., affinis, foliis subtus rufo-tomentosis prima scrutatione jam dignoscenda.

Rami dense squamis sparse aculeis parvis tecti, cortice atro-brunnei ; aculei curvati, 1 lin. longi vel paullo longiores. *Folia* elliptica, basi et apice rotundata, margine leviter dentata, dentibus plerisque sub apice aculeum parvum gerentibus, supra fere glabra (aculeis paucis in nervis majoribus insidentibus) nitentia, subtus densissime rufo-tomentosa, 2–$3\frac{1}{4}$ poll. longa, $1\frac{1}{4}$–$1\frac{3}{4}$ poll. lata ; petiolus 2–5 lin. longus, squamis imbricatis tectus. *Pedunculi* solitarii, 3-flori, 2–$2\frac{1}{2}$ poll. longi, squamas modo ramorum gerentes ; pedicelli 2 lin. longi ; bracteæ late ovatæ, $\frac{1}{2}$ poll. longæ, dorso squamatæ ; bracteolæ duæ angustæ, alabastrum æquantes et circum eum arcuatæ, dorso tomentosæ etiamque setosæ. *Sepala* ovata, 3 lin. longa, similia, nisi quod partes alabastro clauso tectæ glabræ sunt ; superficies nudæ tomentosæ setosaeque. *Petala* basi cum staminum tubo connata, purpurea (?). *Antheræ* 40–50, externæ ad marginem tubi glabri sessiles fere basifixæ, internæ faciei tubi filamentis brevibus affixæ, aliquantulum versatiles. *Ovarium* depresso-globosum, 5-loculare, ovulis numerosissimis ; styli 5, distincti.

Neneba, Mount Scratchley, about 4000 ft.

Malvaceæ.

Urena lobata, *Linn. ; Benth. Fl. Austral.* i., p. 206 ; *F. Muell. Papuan Pl.* i, p. 55.

Neneba, Mount Scratchley, about 4000 ft.

Tiliaceæ.

Elæocarpus aberrans, *Brandis ;* ab omnibus speciebus affinibus differt floribus tetrameris.

Partes novellæ minute puberulæ. *Folia* tenuiter coriacea, obovato-elliptica, undulata, sed integerrima, obtusa vel subacuta, venis secundariis utrinque 6–8 arcuatis ramosis intra marginem anastomosantibus. *Sepala* 4, 6 lin. longa, coriacea, utrinque puberula, libera, triangulari-lanceolata, nervo medio vix conspicuo. *Petala* 4, 8 lin. longa, plana, ovali-oblonga, apice vix latiora, irregulariter 7–9-dentata, utrinque puberula pilis intus rectis non reflexis ; nervi longitudinales plures, venis obliquis juncti. *Stamina* 50–60, toro lato planiusculo carnoso demum multiporoso inserta, arista antheram duplo superante, filamentis quam antheris paullo brevioribus. *Ovarium* tenuissime velutinum 3–4-loculare, dissepimentis apicem versus incompletis, stylo apice minutissime 3-fido. *Fructus* ignotus.

Mount Scratchley, 2000–4000 ft.

All the other species of this section, which will be defined in Sir Dietrich Brandis' forthcoming monograph of the genus, come from Madagascar.

Geraniaceæ.

Geranium dissectum, *Linn.; Benth. Fl. Austral.* i., p. 296 (G. pilosum, *Forst.; DC. Prod.* i, p. 642.

Wharton Range, 11000 ft.

Impatiens Herzogii, *K. Schum. Fl. Kais. Wilh. Land*, p. 56.

Neneba, Mount Scratchley, about 4000 ft.

Meliaceæ.

Dysoxylum sp.

Neneba, Mount Scratchley, about 4000 ft.

Leguminosæ.

Desmodium sinuatum, *Blume ex Baker in Hook. f. Fl. Brit. Ind.*, ii. p. 166.

Neneba, Mount Scratchley, about 4000 ft.

Rosaceæ.

Pygeum costatum, *Hemsley;* foliis *P. oocarpo*, Stapf, simillimum, sed racemis elongatis multifloris facile distinguitur.

Frutex vel arbor parva, dense ramosa, præter inflorescentiam glabra vel cito glabrescens, ramulis ultimis crassiusculis nigrescentibus, internodiis brevissimis. *Folia* petiolata, crassa, coriacea, ovata vel elliptica vel interdum obovata, 1–2¼ poll. longa, utrinque rotundata vel apice emarginata, supra costa atque venis insigniter impressis, subtus costa crassa valde elevata, venis lateralibus primariis utrinque 6–8 ; petiolus crassus, 2–3 lin. longus. *Flores* pubescentes, 3–4 lin. diametro, in racemos axillares quam folia longiores dispositi, distincte pedicellati, 5-meri. *Calycis* pubes-

centis lobi parvi, ovati ; tubus intus glaber. *Petala* majora, fere orbicularia, dense tomentosa. *Stamina* circa 20, glabra. *Ovarium* omnino glabrum, stigmate magno capitato. *Fructus* ignotus.

Mount Scratchley, 10000–13000 ft.

Pygeum papuanum, *Hemsley* ; foliis *P. brevistylo*, K. Schum., simillimum, sed ab hac specie recedit racemis plus quam duplo longioribus, pedicellis gracilioribus, calyce non circumscisso intus omnino glabro.

Arbor laxe ramosa, præter inflorescentiam glabra vel cito glabrescens, ramulis ultimis graciliusculis, internodiis circiter pollicaribus. *Folia* breviter petiolata, coriacea, ovato-lanceolata, 4–7 poll. longa, acuminata, costa supra impressa, subtus elevata, venis lateralibus primariis utrinque 6–7 subtus conspicuis prope marginem inter se arcuatim connexis. *Racemi* graciles, axillares, 3–4 poll. longi, pedicellis gracillimis 3–4 lin. longis. *Flores* 5-meri, pubescentes, 2–2½ lin. diametro. *Calycis* lobi oblongi, obtusi, tubum æquantes. *Petala* similia, sed paullo majora. *Stamina* circiter 20, filamentis filiformibus petala longe excedentibus glabris. *Ovarium* undique glabrum, stigmate capitato. *Fructus* non visus.

Mount Scratchley, 10000–13000 ft.

Rubus Ferdinandi-Muelleri, *Focke in Abh. Nat. Ver. Brem.* xiii., p. 165.

Mount Scratchley, 10000–13000 ft., and Wharton Range, 11000 ft.

Rubus moluccanus, *Linn.* ; *Miq. Fl. Ind. Bat.* i. pt. 1, p. 382 ; *Benth. Fl. Austral.* ii., p. 430.

Neneba, Mount Scratchley, about 4000 ft.

Rubus rosæfolius, *Sm. Pl. Ic. Ined.* iii., t. 60 ; *Benth. Fl. Austral.* ii., p. 431 ; *F. Muell. Papuan Pl.* ii., p. 29.

Neneba, Mount Scratchley, about 4000 ft.

Potentilla microphylla, *D. Don* ; *Focke in Abh. Nat. Ver. Brem.* xiii., p. 164.

Mount Scratchley, 10000–13000 ft.

Potentilla papuana, *Focke in Abh. Nat. Ver. Brem.* xiii., p. 162. (P. leuconota, *F. Muell. in Trans. Roy. Soc. Victoria*, i. pt. 2, p. 5. Non *D. Don*).

Mount Scratchley, 10000–13000 ft.

Potentilla parvula, *Hook. f. ex Stapf in Hook. Ic. Pl.*, t. 2294, *et in Trans. Linn. Soc.*, ser. 2, iv., p. 147.

Mount Scratchley, 10000–13000 ft., and Wharton Range, 11000 ft.

Potentilla sp. *P. papuanæ*, Focke, affinis.

Mount Scratchley, 10000–13000 ft.

Potentilla sp. *P. parvulæ*, Hook. f., affinis.

Mount Scratchley, 10000–13000 ft.

Myrtaceæ.

Rhodomyrtus ?

Neneba, Mount Scratchley, about 4000 ft.

Melastomaceæ.

Osbeckia sp.

Mount Scratchley, 12200 ft.

Otanthera bracteata, *Korth.*; *K. Schum. Fl. Kais. Wilh. Land*, p. 87 ; *Benth. Fl. Austral.* iii., p. 292.

Neneba, Mount Scratchley, about 4000 ft.

Medinilla spp. 2.

Neneba, Mount Scratchley, about 4000 ft.

Onagraceæ.

Epilobium pedunculare, *A. Cunn.* ; *F. Muell. in Trans. Roy. Soc. Victoria*, i. pt. 2, p. 7.

Wharton Range, 11100 ft.

Jussiæa suffruticosa, *Linn.* ; *F. Muell. Papuan Pl.* i., p. 60 ; *Benth. Fl. Austral.* iii., p. 307.

Neneba, Mount Scratchley, about 4000 ft.

Begoniaceæ.

Begonia sp.

Mount Scratchley, 10000–13000 ft.

Umbelliferæ.

Trachymene saniculæfolia, *Stapf in Hook. Ic. Pl.* t. 2308, *et in Trans. Linn. Soc.* ser. 2, iv., p. 167.

Mount Scratchley, 10000–13000 ft.

Falcaria laciniata, *DC. Prod.* iv., p. 110.

Neneba, Mount Scratchley, about 4000 ft.

Oreomyrrhis linearis, *Hemsley ;* a speciebus hactenus cognitis foliis linearibus indivisis gramineis differt. *Icones Plantarum*, t. 2590.

Mount Scratchley, 10000–13000 ft.

Araliaceæ.

Mackinlaya sp.

Neneba, Mount Scratchley, about 4000 ft.

Osmoxylon sp.
Without locality.

Rubiaceæ.

Argostemma sp.
Mount Scratchley, 10000–13000 ft.

Mussænda ferruginea, *K. Schum. Fl. Kais. Wilh. Land* p. 129.
Oriomo River, opposite Daru Island.

Psychotria sp.
Neneba, Mount Scratchley, about 4000 ft.

Cephaelis sp.
Mount Scratchley, 10000–13000 ft.

Cephaelis sp.
Neneba, Mount Scratchley, about 4000 ft.

Saprosma buxifolia, *C. H. Wright* ; a speciebus reliquis foliis parvis oblanceolatis recedit.

Rami tenues, quadrangulares. *Folia* oblanceolata, obtusa, glabra, 9 lin. longa, 4 lin. lata ; petiolus 1 lin. longus ; stipulæ ovatæ, membranaceæ, deciduæ. *Flores* solitarii, axillares ; bracteolæ 2, connatæ, calycis tubo approximatæ. *Calyx* 1 lin. longus, glaber, minute 5-dentatus, persistens. *Corollæ* tubus infundibuliformis, extus glaber, intus pubescens, 6 lin. longus ; lobi 5–6, ligulati, valvati, 1–1½ lin. longi. *Stamina* 5–6 ; filamenta ½ lin. longa, corollæ faucibus affixa ; antheræ subulatæ, filamentis æquilongæ. *Ovarium* 2-loculare ; ovula solitaria, basilaria ; stylus corollæ tubo æquilongus, ramis duobus 1 lin. longis. *Fructus* 4 lin. longus, 4–6-costatus.

Mount Scratchley, 10000–13000 ft.

Coprosma sp. *C. Hookeri*, Stapf, affinis.
Mount Scratchley, 10000–13000 ft.

Dipsaceæ.

Triplostegia repens, *Hemsley* : a speciebus hactenus cognitis habitu gracilitateque differt.

Herba perennis (?), caulibus repentibus radicantibus gracillimis (an speciminis depauperati ?) puberulis. *Folia* radicalia non visa, caulina opposita, longe graciliterque petiolata, membranacea, pilis paucissimis conspersa, oblonga, pinnatifida, cum petiolis circiter pollicaria, lobis ovatis sæpius 7 aristulatis. *Flores* cymosi, pauci, 6–9 aggregati. *Involucellum* dense nigro-glandulosum.

Wharton Range, 11100 ft.

This genus was previously only known to inhabit the mountains of Northern India and Western China.

Compositæ.

Myriactis bellidiformis, *F. Muell. in Trans. Roy. Soc. Victoria*, i. pt. 2, p. 12.

Mount Scratchley, 10000–13000 ft.

Myriactis radicans, *F. Muell. in Trans. Roy. Soc. Victoria*, i. pt. 2, p. 13.

Mount Scratchley, 10000–13000 ft.

Vittadinia Alinæ, *F. Muell. in Trans. Roy. Soc. Victoria*, i. pt. 2, p. 11.

Mount Scratchley, 10000–13000 ft., and Wharton Range 11100 ft.

Vittadinia macra, *F. Muell.? in Trans. Roy. Soc. Victoria*, i. pt. 2, p. 11.

Mount Scratchley, 10000–13000 ft.

Microglossa volubilis, *DC.; Martelli in Nuov. Giorn. Bot. Ital.* xv. (1883), p. 290.

Neneba, Mount Scratchley, about 4000 ft.

Anaphalis Mariæ, *F. Muell. in Trans. Roy. Soc. Victoria*, i. pt. 2, p. 8.

Mount Scratchley, 10000–13000 ft.

Ischnea elachoglossa, *F. Muell. in Trans. Roy. Soc. Victoria*, i. pt. 2, p. 13.

Mount Scratchley, 10000–13000 ft.

Hieracium sp.

Mount Scratchley, 10000–13000 ft.

Vacciniaceæ.

Agapetes costata, *C. H. Wright;* calycis tubo valde costato facile recognoscenda.

Ramuli teres, hirsuti. *Folia* lanceolata, basi rotundata, integra, supra glabra, subtus ad costam pilosa, marginibus pilosis, $1\frac{1}{2}$ poll. longa, 6 lin. lata; petiolus 2 lin. longus, pilosus. *Pedicelli* per paria axillares, incrassati, 8 lin. longi. *Calycis* tubus 3 lin. longus, glaber, costis 5 crassis; lobi breves, acuminati. Corolla tubulosa, glabra, $1\frac{1}{4}$ lin. longa; lobi 5, breves, triangulares, costis crassis. *Filamenta* 4 lin. longa; antheræ 4 lin. longæ, tubis apicalibus 6 lin. longis. *Stylus* staminibus paullo longior.

Mount Scratchley, 10000–13000 ft.

Vaccinium acutissimum, *F. Muell. in Trans. Roy. Soc. Victoria*, i., pt. 2, p. 15.

Mount Scratchley, 10000–13000 ft.

Vaccinium Macbainii, *F. Muell. in Trans. Roy. Soc. Victoria*, i., pt. 2, p. 17.

Mount Scratchley, 10000–13000 ft.

Vaccinium oblongum, *C. H. Wright*; *V. Macbainii*, F. Muell., accedit, foliis oblongis differt.

Caulis fruticosus. *Folia* oblonga, subintegra, subtus sparse punctata cæterum glabra, 1 poll. longa, 5 lin. lata, nervis supra insculptis, costa subtus conspicua; petiolus crassus, 2 lin. longus. *Racemi* breves, prope caulis apicem enati; bracteæ deltoideæ, 1 lin. longæ. *Calycis* tubus globosus, glaber; lobi rotundati, breviter acuminati, 1 lin. lati. *Corolla* 3 lin. longa; tubus brevis; lobi apice concavi, costa crassa. *Stamina* 10, corollæ æquilonga; filamenta 1 lin. longa, plana, pilosa; antheræ subtus acutæ et antice filamentis liberæ, tubis terminalibus leviter adherentibus antice magniporosis. *Stylus* staminibus paullo longior.

Mount Scratchley, 10000–13000 ft.

Vaccinium sp.

Mount Scratchley, 10000–13000 ft.

Ericaceæ.

Gaultheria mundula, *F. Muell. in Trans. Roy. Soc. Victoria*, i., pt. 2, p. 21.

Mount Scratchley, 10000–13000 ft., and Wharton Range, 11000 ft.

Rhododendron comptum, *C. H. Wright*; *R. retuso*, Benn., accedit, sed foliis non emarginatis, corollæ tubo latiore campanulato, lobis suborbicularibus patulis differt.

Rami tenues, plus minusve furfuracei. *Folia* obovato-oblonga, obtusa vel subacuta, minutissime crenulata, supra fere glabra, subtus dense lepidota, 9–12 lin. longa, 3–4 lin. lata, costa supra insculpta subtus elevata, nervis lateralibus celatis; petiolus crassus, 1 lin. longus. *Bracteæ* scariosæ, ovatæ, 9 lin. longæ, deciduæ. *Flores* 3–4-ni ad apices ramorum positi; pedicelli 9 lin. longi, minute pubescentes. *Calyx* parvus, obliquus, lobo uno sæpe subulato, reliquis obsoletis. *Corollæ* tubus campanulatus, 6 lin. longus, apice 3 lin. diam., extus sparse lepidotus, intus minute pilosus; lobi suborbiculares, 5 lin. diam. *Stamina* 10; filamenta glabra; antheræ 1 lin. longæ, poris 2 magnis introrsis. *Ovarium* lepidotum; stylus glaber; stigma leviter dilatatum.

Mount Scratchley, 10000–13000 ft.

Rhododendron nodosum, *C. H. Wright*; *R. Lochæ*, F. Muell., affine, sed foliis basi acutis, corollæ tubo longiore, lobis basi multo constrictis distinctum.

Caulis ramosissimus, nodis incrassatus, scrobiculatus. *Folia* oblonga vel obovata, basi acuta, apice acuta vel subobtusa, supra glabra nervis insculptis, infra lepidota nervis elevatis; petiolus 3–4 lin. longus. *Flores* 3–4-ni ad apices ramorum positi. *Pedicelli* 6–9 lin. longi, tenues, lepidoti. *Corollæ* tubus curvatus,

12–14 lin. longus, extus sparse lepidotus, intus pilosus; lobi plus minusve orbiculares. *Stamina* 10, paullo exserta; filamenta infra pilosa; antheræ $1\frac{1}{2}$–2 lin. longæ, poris terminalibus. *Ovarium* et *styli* basis pilosæ; stigma obliquum, leviter dilatatum.

Mount Scratchley, 10000–13000 ft.

Rhododendron papuanum, *Becc.? Malesia*, i., p. 200.

Mount Scratchley, 10000–13000 ft.

Rhododendron phæochitum, *F. Muell.? in Trans. Roy. Soc. Victoria*, i., pt. 2., p. 23.

Without locality.

Rhododendron sp. *R. longifloro*, Lindl., affine.

Without locality.

Rhododendron sp.

Mount Scratchley, 12200.

Epacridaceæ.

Decatoca Spencerii, *F. Muell. in Trans. Roy. Soc. Victoria*, i., pt. 2., p. 26.

Mount Scratchley, 10000–13000 ft., and Wharton Range, 11100 ft.

Leucopogon Hookeri, *Sond. in Linnaea*, xxvi., p. 248; *Benth. Fl. Austral.* iv., p. 205.

Mount Scratchley, 10000–13000 ft.

Leucopogon papuanus, *C. H. Wright; L. melaleucoidi*, A. Cunn., distinctus calyce longiore, corolla profunde divisa, lobis acutis intus dense pilosis.

Frutex ramosus. *Ramuli* hispidi. *Folia* oblonga, acuta, glabra, integra, siccitate longitudinaliter striata, 5 lin. longa, $1\frac{1}{2}$ lin. lata; petiolus $\frac{1}{2}$ lin. longus. *Flores* 1–2, axillares, bracteis pluribus parvis imbricatis brunneo-marginatis. *Calyx* profunde 5-partitus, 1 lin. longus; lobi ovati, glabri. *Corolla* cylindrica, fauce breviter pilosa, $2\frac{1}{2}$ lin. longa; lobi brevissimi, obtusi. *Antherarum* loculi basi divaricati. *Ovarium* conicum.

Mount Scratchley, 10000–13000 ft.

Myrsinaceæ.

Myrsine capitellata, *Wall.? in Roxb. Fl. Ind. ed. Carey*, ii., p. 295.

Mount Scratchley, 10000–13000 ft.

Myrsine papuana, *Hemsley;* ex affinitate *M. dasyphyllæ*, Stapf, sed minor, gracilior, foliis apice retusis diversa.

Frutex parva, ut videtur, undique glaber, ramulis ultimis gracilibus, internodiis brevissimis. *Folia* conferta, breviter petiolata, crassa, coriacea, obovato-spathulata, 6–12 lin. longa, retusa, sæpe supra medium obscure paucicrenata, deorsum attenuata, subtus inconspicue nigro-lineata, venis immersis obsoletis. *Pedicelli* brevissimi, recurvi. *Fructus* subglobosus, vix sesquilineam longus, pauciglandulosus, sepalis 4 minutis ovato-oblongis vel fere orbicularibus persistentibus.

Mount Scratchley, 10000–13000 ft.

Styraceæ.

Symplocos Englishii, *Hemsley*: species ex affinitate *V. buxifoliæ*, Stapf, a qua differt gracilitate, foliis minoribus, floribus brevissime pedicellatis, calycis lobis in margine glandulosis.

Frutex dense ramosus undique glaberrimus, ramulis subangulatis, internodiis quam foliis brevioribus. *Folia* brevissime petiolata, crassa, coriacea, ovata, elliptica, obovata, vel interdum fere orbicularia, 3–5 lin. longa, basi rotundata vel cuneata, apice rotundata vel subtruncata, supra medium sæpius 5–7-dentata vel crenata, dentibus callosis, venis primariis lateralibus utrinque 2 subtus sat conspicuis. *Flores* axillares, solitarii, 5-meri, cum pedicello brevi folia vix æquantes, basi bracteis 4 calycis lobis simillimis calyculum formantibus subtentis. *Calycis* lobi rotundato-deltoidei, $\frac{1}{2}$–$\frac{3}{4}$ lin. lati, margine glandulosi. *Petala* brevissime connata vel omnino soluta, oblongo-lanceolata, circiter 3 lin. longa, obtusa. *Stamina* 15–20, valde inæqualia, maxima quam petala breviora, filamentis crassiusculis teretibus inter se et cum petalis leviter adhærentibus. *Stylus* crassus, quam stamina longiora brevior. *Fructus* auguste ovoideus, 5–6 lin. longus, calycis lobis coronatus.

Mount Scratchley, 10000–13000 ft., and Wharton Range, 11100 ft.

Symplocos orbicularis, *Hemsley*: inter species papuanenses foliis rotundatis distincta.

Frutex dense ramosus, fere undique glaber, ramulis rigidis, internodiis quam foliis multo brevioribus. *Folia* brevissime petiolata, crassa, coriacea, lutescentia, orbicularia vel interdum late elliptica, obsolete remoteque crenulata, 6–15 lin. lata, venis subtus sat conspicuis. *Flores* racemosi, brevissime crasseque pedicellati, 5–6-meri, glabri, 6–7 lin. diametro; racemi axillares, rigidi, furfuracei, folia æquantes vel paullo superantes, bracteis obsoletis vel cito deciduis. *Calycis* lobi semiorbiculares, circiter lineam lati, margine minute ciliolati. *Petala* ima basi tantum cohærentia, late elliptica vel fere orbicularia, concava, circiter $2\frac{1}{2}$ lin. longa. *Stamina* 15–20, inæqualia, inter se et cum petalis leviter cohærentia. *Fructus* ovoideus, 4–5 lin. longus.

Mount Scratchley, 10000–13000 ft.

Symplocos sp.

Mount Scratchley, 10000–13000 ft.

Apocynaceæ.

Alstonia scholaris, *R.Br.*; *F. Muell. Papuan Pl.* i, p. 70; *Benth. Fl. Austral.* iv., p. 312.

Daru Island.

Tabernæmontana pubescens, *R.Br.*; *F. Muell. Papuan Pl.* i, p. 91; *Benth. Fl. Austral.* iv., p. 311.

Without locality.

Loganiaceæ.

Dolianthus, *C. H. Wright*, (gen. nov.); *Hymenocnemidi*, Hook. f., proximus. *Flores* axillares, solitarii. *Calyx* æqualiter 4-lobatus, sine dentibus intermediis. *Corollæ* tubus infundibuliformis; lobi 4, valvati. *Stamina* 4, ad corollæ fauces subsessilia. *Ovarium* superius, 2-loculare; stylus filiformis; stigma incrassatum, minute 2-lobatum; ovula solitaria, erecta. —Arbuscula *habitu Coprosmæ, foliis coriaceis.*

D. vaccinioides, *C. H. Wright*; *(sp. unica).*

Rami lignosi, 1–2 lin. diam., primum pubescentes, demum glabri. *Folia* opposita, lanceolata, subobtusa, glabra, sempervirentes (?), penninervia, 5 lin. longa, 2 lin. lata; petioli $\frac{1}{2}$ lin. longi; stipulæ ovatæ, caducæ. *Pedicelli* $1\frac{1}{2}$ lin. longi. *Calyx* cupularis, glaber; lobi triangulares, obtusi. *Corollæ* tubus, 6 lin. longus, extus glaber, intus minute pubescens; lobi oblongi, acuti, 2 lin. longi. *Antheræ* sagittatæ, 1 lin. longæ; filamenta antheris æquilonga. *Ovarium* globosum; stylus corollæ æquilongus.

Mount Scratchley, 10000–13000 ft.

Fagræa sp.

Mount Scratchley, 10000–13000 ft.

Gentianaceæ.

Gentiana Ettingshauseni, *F. Muell. in Trans. Roy. Soc. Victoria*, i. pt. 2, p. 27.

Mount Scratchley, 12200 ft., and Wharton Range, 11100 ft.

Gentiana (Chondrophyllum) Giulianettii, *Hemsley*; ex affinitate *G. Ettingshauseni*, F. Muell., a qua differt caulibus simplicibus, corollæ lobis latis brevibus.

Caules erecti, simplices, graciles, 1–2 poll. alti, atque folia omnino glabri. *Folia* tenuiter cartilaginea, sessilia, subpatentia, oblongo-ovata, circiter 2 lin. longa, apice aristata. *Flores* in apicibus caulium vel ramorum solitarii, sessiles, circiter 4 lin. longi. *Calyx* cartilagineus, quam corolla paullo brevior, dentibus erectis subulatis vel fere aciculatis tubo brevioribus. *Corolla* anguste infundibuliformis, lobis brevissimis ovatis apiculatis cum plicaturis fere truncatis alternantibus. *Genitalia* inclusa. *Capsula* deest.

Mount Scratchley, 12200 ft.

Gentiana (Chondrophyllum) Macgregorii, *Hemsl.* : inter species affines foliis ramorum arctissime quadrifariam imbricatis insignis.

Planta perennis (?), minima, glaberrima, caulibus erectis vix pollicaribus vel interdum procumbentibus longioribus ramulos erectos gerentibus. *Folia* sessilia, imbricata, sæpe confertissima, cartilaginea, subulata, concavo-convexa, maxima $2\frac{1}{2}$–3 lin. longa, sed sæpius breviora, apice aristulata. *Flores* terminales, solitarii, sessiles, erecti, circiter 7 lin. longi. *Calyx* cartilagineus, lobis erectis subulatis tubum æquantibus. *Corolla* fere cylindrica, calycem tertia parte excedens, lobis brevibus erectis acutis cum plicaturis rotundatis fere obsolete denticulatis alternantibus. *Stamina* inclusa, filamentis deorsum leviter dilatatis. *Ovarium* clavatum vix stipitatum, stylo brevissimo, stigmatibus 2 sphæroideis. *Capsula* ignota.

Mount Scratchley, 12200 ft.

Boraginaceæ.

Myosotis ?

Without locality.

Havilandia papuana, *Hemsley* : minor quam *H. borneensis*, Stapf, foliis deorsum vix attenuatis pedicellis cum floribus fere æquantibus.

Herba parva, perennis, procumbens, plus minusve setuloso-strigosa, caulibus ramulisque gracillimis. *Folia* spathulato-oblonga, maxima circiter 4 lin. longa, præcipue margine et subtus secus costam setulosa. *Flores* axillares, solitarii, vix 3 lin. diametro. *Calyx* setulosus, profunde 5-lobatus, lobis oblongis. *Corollæ* lobi orbiculares, undulati. *Squamæ* parvæ, rotundatæ. *Stamina* ac *stylus* inclusi. *Nuculæ* cuneato-lunatæ, læves, nitidæ.

Mount Scratchley, 12200 ft., and Wharton Range, 11100 ft.

Solanaceæ.

Solanum aviculare, *Forst. f. Prod.*, p. 18 ; *Benth. Fl. Austral.* iv., p. 447.

Neneba, Mount Scratchley, about 4000 ft.

Solanum dallmannianum, *Warb.? in Eng. Bot. Jahrb.* xiii., p. 415.

Neneba, Mount Scratchley, about 4000 ft.

Solanum torvum, *Sw.* ; *K. Schum. Fl. Kais. Wilh. Land*, p. 117.

Neneba, Mount Scratchley, about 4000 ft.

Scrophulariaceæ.

Vandellia crustacea, *Benth* ; *F. Muell. Papuan Pl.*, i., p. 90 ; *Benth. Fl. Austral.* iv., p. 496.

Neneba, Mount Scratchley, about 4000 ft.

Veronica Lendenfeldii, *F. Muell. in Trans. Roy. Soc. Victoria*, i. pt. 2, p. 29.

Mount Scratchley, 10000–13000 ft., and Wharton Range, 11100 ft.

Veronica sp.

Mount Scratchley, 12400 ft.

Gesneraceæ.

Dichrotrichum sp.

Neneba, Mount Scratchley, about 4000 ft.

Acanthaceæ.

Ptyssiglottis ?

Neneba, Mount Scratchley, about 4000 ft.

Graptophyllum hortense, *Nees; F. Muell. Papuan Pl.* ii., p. 33.

Neneba, Mount Scratchley, about 4000 ft.

Verbenaceæ.

Callicarpa longifolia, *Lam.; K. Schum. Fl. Kais. Wilh. Land*, p. 119; *Benth. Fl. Austral.* v., p. 57.

Neneba, Mount Scratchley, about 4000 ft.

Callicarpa sp.

Neneba, Mount Scratchley, about 4000 ft.

Labiatæ.

Plectranthus ?

Mount Scratchley, 10000–13000 ft.

Polygonaceæ.

Polygonum chinense, *Linn.; DC. Prod.* xiv., p. 130.

Neneba, Mount Scratchley, about 4000 ft.

Nepenthaceæ.

Nepenthes spp. 2.

Without locality.

Piperaceæ.

Piper excelsum, *Forst. f. Prod.*, p. 5.

Neneba, Mount Scratchley, about 4,000 ft.

Myristicaceæ.

Myristica lepidota, *Blume; Miq. Ann. Bot.* ii., p. 46.

Mount Scratchley, 10000–13000 ft.

Thymelæaceæ.

Drapetes ericoides, *Hook. f. in Hook. Ic. Pl.* t. 895; *F. Muell. in Trans. Roy. Soc. Victoria*, i. pt. 2, p. 4.

Mount Scratchley, 10000–13000 ft.

Loranthaceæ.

Loranthus (Heteranthus) pachypus, *Burkill;* verisimiliter *L. pendulo*, Sieber, affinis, sed pedunculis crassis diversissimus.

Rami crassiusculi, glabri, cortice cinerei. *Folia* opposita, anguste obovata, apice rotundata, basi in petiolum 2–3 lin. longum angustata, $1\frac{1}{2}$–$1\frac{3}{4}$ poll. longa, 7–9 lin. lata, coriacea, glabra, nervis lateralibus utrinque duobus tribusve primarioque supra indistinctis infra nullo modo visibilibus. *Inflorescentiæ* foliis breviores, 1–4 ad axillas foliorum enatæ, omnino glabræ; pedunculus 5–7 lin. longus, ramos 3-floros 3–4 umbellatim gerens; pedicellus ultimus 2 lin. longus, fere 1 lin. diam., bractea minuta unguiformi terminatus, florem ad apicem oblique gerens; pedicelli juniores incurvati, sic modo flores obtegentes. *Calycis* tubus cupuliformis, margine minute 4-dentatus. *Perianthii* segmenta (matura non visa) 4, immatura facile separabilia, glabra. *Stamina* prope basin segmentorum perianthii immaturorum affixa. *Ovarium* ellipsoideum, 1 lin. longum; stylus, segmentis perianthii delapsis, 8 lin. longus.

Mount Scratchley, 10000–13000 ft.

One notices at once the swollen joints of the inflorescence which, when in bud or after the fall of the perianth, give it the appearance of a small *Opuntia*, whose last and shortest joint is in this case the bud or the ovary. These joints are narrowed at their insertion, and readily break off at this point.

Euphorbiaceæ.

Aporosa ?

Neneba, Mount Scratchley, about 4000 ft.

Urticaceæ.

Elatostema sp.

Neneba, Mount Scratchley, about 4000 ft.

Coniferæ.

Librocedrus papuana, *F. Muell.; Warb. in Engl. Bot. Jahrb.*, xvi., p. 12.

Neneba, Mount Scratchley, about 4000 ft.

Podocarpus cupressina, *R. Br. ex Mirb. in Mém. Mus. Par.*, xiii., p. 75; *Becc. Malesia*, i, p. 179.

Mount Scratchley, 10000–13000 ft., and Wharton Range, 11100 ft.

Hydrocharidaceæ.

Ottelia alismoides, *Pers. Syn. Pl.* i, p. 400; *Benth. Fl. Austral.* vi., p. 527.

Iaro River, near Magibiri, in the Astrolabe Range.

Orchidaceæ.

Dendrobium (Stachyobium) rigidifolium, *Rolfe;* ad *D. mirbelianum*, Gaud., accedit, recedit petalis latis sepalis æqualibus, labello minore.

Pseudobulbi teretes, $\frac{3}{4}$ ped. longi, polyphylli. *Folia* ovata, subobtusa, sessilia, coriacea, 1–$1\frac{3}{4}$ poll. longa. *Racemi* terminales, 2–$2\frac{1}{2}$ poll. longi, basi vaginis tubulosis imbricatis obtectæ. *Bracteæ* ovato-oblongæ, obtusæ, 4–6 lin. longæ. *Pedicelli* $1\frac{1}{4}$ poll. longi. *Sepalum* posticum oblongum, breviter cuspidato-acuminatum, 10–12 lin. longum; lateralia triangulari-falcata, acuta, carinata, 10–12 lin. longa. *Petala* obovato-oblonga, obtusa, plana, 9–11 lin. longa, $4\frac{1}{2}$ lin. lata. *Labellum* integrum, elliptico-oblongum, obtusum, recurvum, 6–7 lin. longum, lateribus erectis paullo undulatis, disco medio bicarinato. *Columna* lata, 1 lin. longa. *Mentum* breviter conicum, obtusum, 4 lin. longum.

Mount Scratchley, 12200 ft.

This species evidently belongs to the group containing *D. mirbelianum*, Gaud., and *D. veratrifolium*, Lindl., among which it is remarkable for its broad flat petals not longer than the sepals.

Dendrobium (Pedilonum) brevicaule, *Rolfe;* ex affinitate *D. Cuthbertsoni*, F. Muell., a quo differt floribus majoribus, labello cuneato-oblongo abrupte acuminato.

Pseudobulbi brevissimi, cæspitosi, oblongi, $\frac{1}{2}$–1 poll. longi, 2–4-phylli. *Folia* lineari-lanceolata, subacuta, $\frac{3}{4}$–4 poll. longa, 2–4 lin. lata. *Racemi* terminales, breves, 2–3-flori. *Bracteæ* late ovatæ, acutæ, concavæ, imbricatæ, 2–5 lin. longæ. *Pedicelli* $\frac{3}{4}$–1 poll. longi, trialati. *Sepalum* posticum oblongo-lanceolatum, acutum, 4–7 lin. longum; lateralia triangulari-ovata, acuta vel acuminata, carinata, 2–$3\frac{1}{2}$ lin. lata, basi cum columnæ pede in mentum longum extensa. *Petala* elliptico-lanceolata, acuta, 3–6 lin. longa. *Labellum* cuneato-oblongum, abrupte acuminatum, 7–11 lin. longum, $1\frac{1}{2}$–3 lin. latum, disco lævi. *Columna* lata, 2–3 lin. longa. *Mentum* conico-elongatum, acutum, paululo incurvatum, 8–12 lin. longum.

Mount Scratchley, 12200 ft.

A remarkable alpine species with relatively very large flowers. It is one of a small group characterised by its very dwarf pseudobulbs, the other known species being *D. cerasinum*, Ridl., *D. puniceum*, Ridl., and *D. Cuthbertsoni*, F. Muell., all natives of New Guinea.

Acanthephippium javanicum, *Blume Bijdr.* p. 353; *Hook. in Bot. Mag.*, t. 4492; *Ridl. in Journ. Bot.* 1886, p. 354.

Neneba, Mount Scratchley, at about 4000 ft.

Glomera papuana, *Rolfe*; ad *G. erythrosmam*, Blume, accedit, foliorum vaginis verrucosis, laminis triplo vel quadruplo minoribus differt.

Caules graciles vel crassiusculi, erecti, 4–6 poll. alti, polyphylli. *Folia* oblongo-vel lineari-lanceolata, oblique et inæqualiter bidentata, 1–1½ poll. longa, 1–3 lin. lata; vaginæ tuberculato-verrucosæ. *Capitula* 7–9 lin. lata, 5–8-flora. *Bracteæ* late ovatæ, subacutæ, striatæ, 3–4 lin. longæ. *Pedicelli* 2–3 lin. longi. *Sepalum* posticum ovatum, subacutum, concavum, 1½ lin. longum; lateralia late ovata, subacuta, concava, basi obliqua. *Petala* ovata, subacuta, concava, 1½ lin. longa. *Labellum* basi ample saccatum, obtusum, 2 lin. longum, 1 lin. latum; lamina patens, ovato-oblonga, obtusa, ¾ lin. longa, lateribus medio plicato-reflexis, disco quinque-carinato. *Columna* clavata, 1¼ lin. longa, alis oblongis obtusis. *Mentum* saccato-oblongum, obtusum, 2 lin. longum.

Oriomo River.

An interesting addition to the genus, the two previously known species being *G. erythrosma*, Blume, from Java, and *G. montana*, Reichb. f., from Fiji.

Giulianettia, *Rolfe* (*gen. nov.*). *Sepala* patentia, subæqualia, lateralia basi ultra insertionem oblique extensa, connata, pone labelli calcarem laminam liberam breviter bilobam formantia. *Petala* sepalis angustiora. *Labellum* basi columnæ affixum et cum ea in tubum brevem connatum, basi longe calcaratum; lamina erecta, integra, late cordato-ovata, concava, brevissima, medio crassiuscula. *Columna* brevissima, crassa; clinandrium cavum, amplum, crenulatum. *Anthera* terminalis, opercularis, incumbens, convexa, 2-locularis; pollinia non visa.—Herba *epiphytica, humilis*. Flores *terminales, solitarii, e medio bractearum imbricatarum paleaceo-scariosarum horizontale ad apices ramorum enascentes.*

Giulianettia tenuis, *Rolfe* (*sp. unica*). *Icones Plantarum*, t. 2616.

Mount Scratchley, 12200 ft.

A very interesting monotype, clearly allied to *Ceratostylis*, but differing in its large solitary flowers, in the auriculate bases of the lateral sepals united into a free limb behind the spur of the lip, not forming a mentum with the foot of the column, and in the long spur of the lip, which is about three times as long as the limb. The pollinia were missing from the flower examined.

Calanthe Englishii, *Rolfe*; ad *C. clavatam*, Lindl., accedit, differt labello integro, calcare oblongo et duplo breviore.

Rhizoma repens. *Folia* lineari-lanceolata, acuminata, in petiolum attenuata, 1–1¾ ped. alta, 7–9 lin. lata. *Scapus* ¾ ped. altus, vaginis oblongis paucis obtectus. *Racemus* brevis, pauciflorus. *Bracteæ* deciduæ. *Pedicelli* 6–7 lin. longi. *Sepala* elliptico-oblonga, 4–5 lin. longa, posticum obtusum, lateralia

apiculata. *Petala* elliptico-oblonga, obtusa, 3–4 lin. longa. *Labellum* ad apicem columnæ affixum, integrum, late obovatum, obtusum, concavum, 3–4 lin. longum, basi venis 2 paullo incrassatis; calcar elliptico-oblongum, obtusum, 2 lin. longum. *Columna* clavata, $1\frac{1}{2}$ lin. longa.

Neneba, Mount Scratchley, at about 4000 ft.

The bracts fall before the flowers expand, as in other species of this affinity.

Podochilus densiflorus, *Blume in Rumphia*, iv., p. 44, tt. 192, fig. 5, 200, fig. B.; *Miq. Ann. Bot.* iii., p. 687.

Vanapa Valley, 2000–4000 ft.

Pterostylis papuana, *Rolfe;* ad *P. cucullatam*, R. Br., accedit, sed foliis angustioribus, sepalis petalisque longioribus, labello angustiore facile distinguitur.

Caulis gracilis, circa 7 poll. altus. Folia radicalia petiolata, ovato-oblonga, subacuta, 1–$1\frac{1}{4}$ poll. longa, 5–6 lin. lata; petiolus 6–9 lin. longus; folia caulina sessilia, lanceolata, acuta, concava, 10–12 lin. longa, 2–3 lin. lata. *Flos* solitarius. *Bractea* lanceolata, acuta, concava, 10–11 lin. longa. *Sepalum* posticum oblongo-lanceolatum, acuminatum, incurvum, 2 poll. longum; lateralia basi lanceolata, 1 poll. longa, apice caudato-acuminata, 7–8 lin. longa. *Petala* falcato-lanceolata, acuta, $1\frac{3}{4}$ poll. longa. *Labellum* anguste lanceolatum, acuminatum, 9–10 lin. longum; appendix uncata, 2 lin. longa, apice penicillata. *Columna* 9 lin. longa; alæ dolabriformes, utrinque apice in dentem filiformem extensæ, basi in lobum oblongum extensæ.

Mount Scratchley, 12200 ft.

This discovery extends the range of the genus to New Guinea, it having previously been known only from Australia, New Zealand, and New Caledonia.

Scitamineæ.

Alpinia sp., *A. macranthæ*, Scheff., affinis.

Neneba, Mount Scratchley, about 4000 ft.

Alpinia sp.

Mount Scratchley, 12200 ft., and Wharton Range, 11100 ft.

Iridaceæ.

Libertia pulchella, *Spreng. Syst.* i., p. 169; *Benth. Fl. Austral.* vi., p. 413.

Mount Scratchley, 12200 ft.

Liliaceæ.

Cordyline terminalis, *Kunth: F. Muell. Papuan Pl.* i., p. 31; *Benth. Fl. Austral.* vii., p. 21.

Neneba, Mount Scratchley, about 4000 ft.

Astelia alpina, *R. Br.? F. Muell. in Trans. Roy. Soc. Victoria*, i., pt. 2, p. 35 ; *Benth. Fl. Austral.* vii., p. 11.

Mount Scratchley, 12200 ft., and Wharton Range, 11100 ft.

Dianella memorosa, *Lam.* (D. ensifolia, *Red.*) ; *K. Schum. Fl. Kais. Wilh. Land*, p. 14 ; *Benth. Fl. Austral.* vii., p. 16.

Neneba, Mount Scratchley, about 4000 ft.

Commelinaceæ.

Pollia sp.

Neneba, Mount Scratchley, about 4000 ft.

Palmæ.

Areca sp.

Without locality.

Adelonenga sp.

Without locality.

Orania sp., *O. regali*, Zipp., affinis.

Vanapa Valley, 2000–4000 ft.

Korthalsia sp.

Without locality.

In each case the specimens of the palms are only sufficient to determine the genus.

Pandanaceæ.

Pandanus sp.

Without locality.

Naiadaceæ.

Aponogeton monostachyon, *Linn. f.; Benth. Fl. Austral.* vii., p. 188.

Magibiri, Astrolabe Range, 2000 ft.

Eriocaulaceæ.

Eriocaulon sp.

Mount Scratchley, 12200 ft.

Cyperaceæ.

Cyperus pedunculosus, *F. Muell.; Benth. Fl. Austral.* vii., p. 272.

Vanapa Valley, 2000–4000 ft.

Scirpus fluitans, *Linn.; Benth. Fl. Austral.* vii., p. 326.

Mount Scratchley, 12200 ft.

Hypolytrum Parvibractea, *C. B. Clarke; H. prolifero*, Boeck. proxima, differt spicis rubro-brunneis, culmi vaginis aphyllis.

Culmus gracilis, 2 ped. longus, aphyllus; nodi 3, distantes; vaginæ in nodis sitæ, 2 poll. longæ, rubro-brunneæ, apice unilateraliter acutatæ. *Folia* basalia longa, $\frac{1}{2}$ poll. lata, 3-nervia, in marginibus modice spinulosa. *Panicula* composita, $1\frac{1}{2}$ poll. alta, 3 poll. lata, in pseudo-umbellam fere depressa, omnino rufo-brunnea, bracteis $\frac{1}{3}$–$\frac{1}{2}$ poll. longis ovatis acutis. *Spicæ* longæ, ellipsoideæ, brunneæ. *Stylus* 2-fidus. *Nucis* rostrum conicum, nuci subæquilongum.

Mount Scratchley, 12250 ft.

Carpha alpina, *R. Br.; F. Muell. in Trans. Roy. Soc. Victoria*, i., pt. 2, p. 35; *Benth. Fl. Austral.* vii., p. 381.

Mount Scratchley, 12200 ft.

Schœnus curvulus, *F. Muell. in Trans. Roy. Soc. Victoria*, i., pt. 2, p. 36.

Mount Scratchley, 12200 ft.

Costularia paludosa, *C. B. Clarke;* (Schœnus palŭdosus, *Poir. Encyc. Suppl.*, ii., p. 251; Tricostularia paludosa, *Benth. Fl. Austral.*, vii., p. 382).

The generic name *Costularia* is published in Dur. et Schinz Consp. Fl. Afr., v., p. 658, with list of species and of distribution numbers.

Gahnia javanica, *Moritzi; F. Muell. in Trans. Roy. Soc. Victoria*, i., pt. 2, p. 36.

Mount Scratchley, 12200 ft.

Carex vulgaris, *Fries*, var., **gaudichaudiana**, *Benth. Fl. Austral.* vii., p. 442.

Without locality.

Carex sp., *C. lindleyanæ*, Nees, affinis

Wharton Range, 11100 ft.

Gramineæ.

Microlæna Giulianettii, *Stapf;* affinis *M. avenaceæ*, Hook. f., sed foliis brevibus rigidis, panicula angustissima stricta, spiculis rigidioribus diversa.

Gramen cæspitosum, glabrum, innovationibus extravaginalibus. *Culmi*, internodiis (summo ad 2 poll. longo excepto) omnibus brevissimis vel subnullis, foliis superati, tota longitudine vaginati. *Folia* omnia basalia; vaginæ infimæ ad squamas reductæ, sequentes lateraliter compressæ, carinatæ, firmæ, striatæ ad os parce barbatæ, persistentes, vagina summa paniculæ basin amplectens; ligulæ brevissimæ, truncatæ, membranaceæ; laminæ lanceolato-lineares, basi attenuatæ, sensim in vaginam abeuntes, apice breviter

acutæ, 4–6 poll. longæ, 2–4 lin. latæ, erectæ, firmæ, rigidæ, subtus superne scaberulæ, cæterum glabræ. *Paniculæ* strictæ, angustissimæ, 4–6 lin. longæ, folia æquantes vel paullo exsertæ; rami solitarii, remoti, appressi, ut rhachis compressa scaberuli, parce remoteque ramulosi; pedicelli 2–5 lin. longi, filiformes, apice clavati læviusculi. *Spiculæ* lineares, pallidæ, cum arista 10–11 lin. longæ. *Glumæ* minutæ, ovatæ, obtusæ, scariosæ, inferior $\frac{3}{8}$–$\frac{1}{2}$ lin., superior $\frac{3}{4}$–1 lin. longæ. *Valvæ* steriles, subcoriaceæ, lateraliter compressæ, carinatæ, lineares, sensim in aristam abeuntes, 7-nerves, superne scaberulæ, basi barbatæ, inferior circiter 4 lin., superior 6 lin. longæ; illius arista brevis, hujus valvam subæquans, utraque scabrida; valva fertilis admodum compressa, oblongo-linearis, subacuta, $3\frac{1}{2}$ lin. longa, tenuiter chartacea, 7-nervis; palea hyalina, enervis, 2 lin. longa. *Stamina* 2; antheræ 1 lin. longæ.

Mount Scratchley, 12200 ft.

Muehlenbergia sp.

Vanapa Valley, 2000–4000 ft.

Deyeuxia sclerophylla, *Stapf;* nulli speciei arcte affinis, glumis valvaque rigidis, arista e sinu orta distincta, potius sectionem novam *Sclerodeyeuxiam* sistens. *Icones Plantarum*, t. 2605.

Mount Scratchley, 12200 ft.

The glumes are as rigid as those of *Ammophila*, and the valve, though thinner, is still firmer than in any other *Deyeuxia* I have seen. The leaves are in structure very like the leaves of *Ammophila arenaria*, but the blades are more compressed. The awn springs from the sinus of the valve, whilst it is, I believe, always dorsal in the true Deyeuxias and reduced to a subterminal mucro or quite absent in *Ammophila*. This insertion of the awn in connection with the rigid side lobes and the shortly excurrent side nerves would bring the species near to *Pentapogon*, but in that genus the rhachilla is glabrous and the top of the ovary conspicuously appendaged. The great similarity of the structure of the blades of *Deyeuxia sclerophylla* and of the other grasses of Giulianetti's collection from Mount Scratchley, with the exception of *Microlæna*, is very singular, and indicative of great (probably periodical) dryness of the air.

Danthonia oreoboloides, *Stapf*; affinis *D. exiguæ*, Stapf (D. paucifloræ, *Buch., non R. Br.;* Triodiæ exiguæ, *Kirk*), sed minor, tenuior, spiculis minoribus, valvis exsertis integris acuminatis distincta. *Icones Plantarum*, t. 2606.

Mount Scratchley, 12200 ft.

I have no doubt that this is the grass which Sir Ferdinand von Mueller described in *Trans. Roy. Soc. Victoria*, i., pt. 2, p. 38 and named provisionally *Festuca oreoboloides*.

Lophatherum gracile, *Brongn.; K. Schum. Fl. Kais. Wilh. Land*, p. 23.

Vanapa Valley, 2000–4000 ft.

Poa callosa, *Stapf*; affinis *P. papuanæ*, Stapf, sed foliis lævissimis ad laminæ basin callosis, valvis minus acuminatis 5-nervibus, paleis in carinis scaberulis quam valvis brevioribus distincta.

Gramen dense cæspitosum. *Culmi* erecti, graciles, 3 poll. longi, sub panicula scaberuli, cæterum læves, vix ad medium dense vaginatæ internodiis summo excepto brevissimis basalibus. *Folia* ad basin dense congesta, flabellatim imbricata, glaberrima, lævissima; vaginæ arctæ, leviter compressæ, laxe leviterque striatæ; ligulæ brevissimæ, acutæ, membranaceæ; laminæ setaceæ, lateraliter compressæ, canaliculatæ, apice brevissime et oblique acutatæ, 2 poll. longæ, rigidæ, erectæ. *Panicula* paupera, linearis, 9–10 lin. longa, stricta; rami inferiores geminati, rhachi appressi, 2–1-spiculati, filiformes, scaberuli; pedicelli ramis similes, crassiusculi, laterales circa 1 lin. longi. *Spiculæ* 2–1-floræ, oblongæ, fere 2 lin. longæ, pallidæ. *Glumæ* oblongo-ovatæ, acutæ, læves, inferior mediam spiculam æquans 3-nervis, superior paullo longior sub-5-nervis. *Valvæ* oblongæ, acutæ, $1\frac{2}{3}$ lin. longæ, rigidulæ, læves, 5-nerves. *Paleæ* quam valvæ paullo breviores, carinis asperulis. *Lodiculæ* inæqualiter 2-lobæ. *Antheræ* $\frac{1}{3}$ lin. longæ.

Mount Scratchley, 12200 ft.

Poa minimiflora, *Stapf;* affinis *P. epileucæ*, Stapf (Deyeuxiæ epileucæ, *Stapf*), sed foliis tenuiter setaceis, paniculis uberioribus, spiculis minoribus diversa. *Icones Plantarum*, t. 2608.

Mount Scratchley, 12200 ft.

Poa papuana, *Stapf*; affinis *P. minimifloræ*, Stapf, sed foliis minus tenuibus rigidioribus scaberulis, spiculis paullo majoribus, valvis acute acuminatis quam palea lævi paululo brevioribus diversa. *Icones Plantarum*, t. 2607.

Mount Scratchley, 12200 ft.

Poa papuana, *P. callosa*, *P. minimiflora* and *P. epileuca* form a small natural group, the affinity of which lies evidently with *Poa kerguelensis*, Hook. f. and *P. antarctica*, Stapf (Triodia antarctica, *Hook. f.*). In my paper on the flora of Kinabalu (*Trans. Linn. Soc.*, ser. 2. iv., p. 247), I have pointed out that the grass which I then described as *Deyeuxia epileuca* was "a very marked species the affinity of which lies rather with some Australian species (of *Deyeuxia*) than with any others, though it is far from being closely connected" and that "the spikelets come, perhaps, nearer to those of *D. gunniana*, Benth."; but I was then "still doubtful as to the true systematic position" of the grass (l. c. 105). The discovery of *Poa papuana* and *P. minimiflora* has now given me the key to it in the direction indicated above. This group of *Poæ* is well marked off from the rest by the minute 1–2-flowered spikelets and the firmer texture of the glumes and valves and will probably have to stand as a section of *Poa*. *Deyeuxia gunniana*, Benth., and the closely allied *D. breviglumis*, Benth., are in general habit strikingly similar to *P. papuana* and *P. minimiflora*, but the obtuse glumes and the minutely emarginate and mucronulate valves with nerves evanescent towards

the base point to a different genus. *P. papuana*, and, perhaps, also *P. minimiflora* are evidently the grasses which Sir Ferdinand von Mueller enumerated as *Festuca pusilla* (*Trans. Roy. Soc Victoria*, i., pt. 2, p. 38).

Festuca monantha, *Stapf*; affinis *F. papuanæ*, Stapf, sed culmis alte vaginatis foliis brevioribus, vaginis inferioribus brevibus, spiculis 1-floribus minoribus, glumis valvam æquantibus, ovario apice pilosulo diversa.

Gramen dense cæspitosum, innovationibus intravaginalibus. *Culmi* graciles, erecti. lævissimi, ½ ped. alti, tota longitudine vaginati. *Folia* basi congesta; vaginæ lateraliter compressæ, obtuse carinatæ, firmulæ, 7–9-nerves, persistentes, basales ½ poll. longæ; ligulæ brevissimæ, obtuse subauriculatæ; laminæ erectæ, setaceæ, arcte plicatæ, subacutæ, 4 poll. longæ, rigidæ, vix costatæ, læves. *Panicula* linearis, angustissima, 2 poll. longa, erecta; rami distantes, simplices, rhachi angulatæ scabræ appressæ, 3–2-spiculatæ, compressæ, longiores circiter ½ poll. longæ; pedicelli crassiusculi, ramis similes, laterales ad 1 lin. longi. *Spiculæ* 1-floræ, fere 2½ lin. longæ, virides; rhachillæ processus longiusculus, scaberulus. *Glumæ* lanceolatæ, acuminatæ, membranaceo-marginatæ, cæterum herbaceæ, inferior 2 lin. paullo longior 1–sub-3-nervis, superior paullo longior latior 3-nervis. *Valva* lineari-lanceolata (a latere) in setam scabram tenuem subæquilongam abeuns, superne scabridula, 5-nervis, glumam superiorem æquans vel ea subbrevior. *Palea* valvam æquans, carinis superne scabris. *Lodiculæ* fimbriatæ. *Antheræ* ½–⅝ lin. longæ. *Ovarium* apice minute pilosulum. *Caryopsis* oblonga; hilum medium excedens.

Mount Scratchley, 12200 ft.

Festuca papuana, *Stapf*; affinis *F. magellanicæ*, Lam., inter species antarcticas, *F. ovinæ*, Linn., subsp. *F. frigidæ*, Hack., inter species orbis veteris; ab utraque foliis longis. valvarum nervis magis conspicuis; ab illa præterea vaginis fere ad os integris, ab hac laminis rigidioribus, panicula longiore, spiculis paullo majoribus diversa.

Gramen dense cæspitosum, innovationibus intravaginalibus crebris. *Culmi* erecti 1–2 ped. alti, lævissimi, vix ad medium vaginati. *Folia* numerosa ad basin subflabellatim arcte congesta; vaginæ lateraliter compressæ, obtusæ carinatæ, fere ad os integræ, exteriores 5–7- interiores 3- nerves, persistentes; ligulæ brevissimæ, obtuse subauriculatæ; laminæ erectæ, setaceæ, arcte plicatæ, acutissimæ, 4–9 poll. longæ, rigidæ, subpungentes, plus minusve tricostatæ, tenuiter scaberulæ vel fere læves. *Panicula* contracta, anguste linearis, 3–4 poll. longa; rhachis angulata, scabrida, stricta; rami distantes, rhachi appressi, subsimplices, inferiores ad 1½ poll. longi et 5–8-spiculati, filiformes, scaberuli; pedicelli ramis similes, laterales 1–3 lin. longi. *Spiculæ* 3–4-floræ, oblongæ, 3½ lin. longæ, purpureo- vel nigro-fuscescentes vel ad basin valvarum virides. *Glumæ* paullo inæquales, oblongo-lanceolatæ, carinatæ, 3-nerves, læves vel superne obscure asperulæ, inferior circiter 2 lin., superior 2½ lin. longa. *Valvæ* dissitæ, lanceolatæ in aristam brevem abeuntes, superne scaberulæ vel sublæves, firmulae, 5-nerves, nervis prominulis. *Paleæ* valvas æquantes,

carinis scaberulis. *Lodiculæ* inæqualiter 2-lobæ, fimbriatulæ. *Antheræ* ¾ lin. longæ. *Ovarium* glabrum. *Caryopsis* linearioblonga, a dorso compressa, 1½ lin. longa, antice vix sulcata; hilum ultra medium productum lineare.

Mount Scratchley, 12200 ft.

This is, no doubt, the plant enumerated by Sir Ferdinand von Mueller as *F. ovina* in *Trans. Roy. Soc. Victoria* i., pt. 2, p. 38.

Filices.

Gleichenia flagellaris, *Spreng.*; *Hook. & Baker, Syn. Fil.*, p. 14; *F. Muell. Papuan Pl.* ii., p. 35.

Without locality.

Hymenophyllum demissum, *Sw.*; *Hook & Baker, Syn. Fil.*, p. 61.

Mount Scratchley, 12400 ft.

Hymenophyllum dilatatum, *Sw.*; *Hook. & Baker, Syn. Fil.*, p. 62; *F. Muell. in Ann. Rep. Brit. N. Guin.* 1894, p. 126.

Vanapa Valley, 2000.

Hymenophyllum tunbridgense, *Sm.*; *F. Muell. in Trans. Roy. Soc. Victoria*, i. pt. 2, p. 40; *Benth. Fl. Austral.* vii., p. 706.

Mount Scratchley, 12200 ft.

Trichomanes apiifolium, *Presl*; *Hook. & Baker, Syn. Fil.*, p. 86; *Becc. Malesia*, iii., p. 34; *Benth. Fl. Austral.* vii., p. 703.

Vanapa Valley, 2000–4000 ft.

Trichomanes javanicum, *Blume*; *Hook. & Baker, Syn. Fil.*, p. 83; *Becc. Malesia*, iii., p. 33; *Benth. Fl. Austral.* vii., p. 702.

Vanapa Valley, 2000–4000 ft.

Trichomanes maximum, *Blume*; *Hook. & Baker, Syn. Fil.*, p. 86; *Becc. Malesia*, iii., p. 34.

Vanapa Valley, 2000–4000 ft.

Trichomanes pyxidiferum, *Linn.*; *Hook. & Baker, Syn. Fil.*, p. 81; *F. Muell. in Ann. Rep. Brit. N. Guin.* 1894, p. 126; *Benth. Fl. Austral.* vii., p. 703.

Vanapa Valley, 2000–4000 ft.

Trichomanes rigidum, *Sw.*; *Hook. & Baker, Syn. Fil.*, p. 86; *Becc. Malesia*, iii., p. 38; *Benth. Fl. Austral.* vii., p. 702.

Vanapa Valley, 2000–4000 ft.

Trichomanes trichophyllum, *Moore*; *Hook. & Baker, Syn. Fil.*, p. 466; *Becc. Malesia*, iii., p. 34.

Mount Scratchley, 12400 ft.

Davallia (Humata) bipinnatifida, *Baker*; a speciebus reliquis hujus subgeneris recedit frondibus lanceolato-deltoideis bipinnatifidis.

Rhizoma gracile, longe repens, paleis lanceolatis appressis membranaceis pallide brunneis. *Lamina* lanceolato-deltoidea, bipinnatifida, 5–6 poll. longa, deorsum 2 poll. lata, coriacea, glabra, rhachi primaria gracili nuda; pinnæ sessiles, inferiores reliquis majores, steriles oblongæ, obtusæ, deorsum parce breviter pinnatifidæ, basi cuneatæ; fertiles angustiores, profunde pinnatifidæ, lobis erecto-patentibus, inferioribus oblongis obtusis; venæ flabellatæ, perspicuæ; petiolus gracilis, nudus, 3–4 poll. longus. *Sori* ad lobos superiores solitarii, ad lobos inferiores 2–3-ni. *Indusium* semiorbiculare, persistens, firmum, glabrum, $\frac{1}{2}$ lin. diam.

Vanapa Valley, 2000–4000 ft.

Davallia blumeana, *Hook.*; *Hook. & Baker, Syn. Fil.*, p. 93; *F. Muell. Papuan Pl.*, i., p. 77.

Vanapa Valley, 2000–4000 ft.

Davallia hirta, *Kaulf.*; *Hook. & Baker Syn. Fil.*, p. 100.

Vanapa Valley, 2000–4000 ft.

Davallia (Loxoscaphe) lanceolata, *Baker*; a speciebus reliquis hujus subgeneris recedit frondibus parvis lanceolatis.

Rhizoma gracile, breviter repens. *Lamina* lanceolata, bipinnata, 2–4 poll. longa, 6–8 lin. lata, glabra, viridia; rhachis nuda, straminea; pinnæ multæ, contiguæ, flabellato-pinnatæ, segmentis secundariis paucis anguste linearibus uninervatis 1–1$\frac{1}{2}$ lin. longis apice dilatatis; petiolus brevis, gracilis, stramineus, deorsum brunneo-tinctus. *Sori* solitarii, terminales, glabri. *Indusium* persistens, glabrum, viride.

Vanapa Valley, 2000–4000 ft.

Davallia pinnata, *Cav.*; *Hook. & Baker, Syn. Fil.*, p. 98.

Vanapa Valley, 2000–4000 ft.

Davallia repens, *Desv.*; *Hook. & Baker, Syn. Fil.*, p. 93; *Becc. Malesia* iii., p. 36.

Mount Scratchley, 12400 ft., and Vanapa Valley, 2000–4000 ft.

Lindsaya cultrata, *Sw.*; *Hook. & Baker, Syn. Fil.*, p. 105; *Becc. Malesia* iii., p. 36; *Benth. Fl. Austral.* vii., p. 719.

Vanapa Valley, 2000–4000 ft.

Lindsaya lobata, *Poir.*; *Hook. & Baker, Syn. Fil.*, p. 111; *F. Muell. Papuan Pl.* i., p. 78; *Benth. Fl. Austral.* vii., p. 720.

Vanapa Valley, 2000–4000 ft.

Asplenium amboinense, *Willd*; *Seem. Fl. Vit.*, p. 353; *Becc. Malesia* iii., p. 39.

Vanapa Valley, 2000–4000 ft.

Asplenium cuneatum, *Lam.; Hook. & Baker, Syn. Fil.*, p. 214; *F. Muell. Papuan Pl.* ii., p. 37.

Vanapa Valley, 2000–4000 ft.

Asplenium falcatum, *Lam.; Hook. & Baker, Syn. Fil.*, p. 208; *F. Muell. Papuan Pl.*, i., p. 16; *Benth. Fl. Austral.* vii., p. 746.

Mount Scratchley, 10000–13000 ft.

Asplenium longissimum, *Blume; Hook. & Baker, Syn. Fil.*, p. 199; *F. Muell. Papuan Pl.* ii., p. 37.

Vanapa Valley, 2000–4000 ft.

Asplenium tenerum, *Forst.; Hook. & Baker, Syn. Fil.*, p. 201; *Mett. in Miq. Ann. Bot.* ii., p. 234.

Vanapa Valley, 2000–4000 ft.

Didymochlæna lunulata, *Desv.; Hook. & Baker, Syn. Fil.*, p. 248.

Vanapa Valley, 2000–4000 ft.

Aspidium aristatum, *Sw.; Hook. & Baker, Syn. Fil.*, p. 255; *Benth. Fl. Austral.* vii., p. 757.

Vanapa Valley, 2000–4000 ft.

Nephrodium albo-punctatum, *Desv.; Hook. & Baker, Syn. Fil.*, p. 264.

Vanapa Valley, 2000–4000 ft.

Nephrodium (Lastrea) dissitifolium, *Baker;* ad *N. elongatum*, Hook. et Grev., accedit; differt pinnulis haud contiguis, indusio haud persistente.

Lamina oblongo-lanceolata, tripinnata, 1½–2 ped. longa, subcoriacea, glabra; rhachis nuda, gracilis, pallide brunnea; pinnæ inferiores majores, lanceolatæ, breviter petiolatæ, 4–5 poll. longæ; pinnulæ ovato-oblongæ, sessiles, obtusæ, basi cuneatæ, pinnatifidæ vel basi pinnatæ; segmenta tertiaria oblonga, obtusa, erecto-patentia; petiolus nudus, nitidus, pallide brunneus; venæ in segmentis tertiariis pinnatæ. *Sori* utrinque costam pinnularum uniseriati, haud contigui. *Indusium* reniforme, glabrum, cito deciduum.

Mount Scratchley, 10000–13000 ft.

Nephrodium patens, *Desv.*; *Hook. & Baker, Syn. Fil.*, p. 262; *Becc. Malesia* iii., p. 43.

Vanapa Valley, 2000–4000 ft.

Nephrolepis acuta, *Presl*; *Hook. & Baker, Syn. Fil.*, p. 301; *Becc. Malesia* iii., p. 44.

Vanapa Valley, 2000–4000 ft.

Polypodium cucullatum, *Nees*; *Hook. & Baker, Syn. Fil.*, p. 324 *Becc. Malesia* iii., p. 47.

Wharton Range, 11100 ft.

Polypodium undosum, *Baker in Journ. Bot.* 1890, p. 108 ; *F. Muell. in Ann. Rep. Brit. N. Guin.* 1894, p. 126.

Mount Scratchley, 10000–13000 ft.

Polypodium obliquatum, *Blume* ; *Hook. & Baker*, *Syn. Fil.*, p. 328 ; *F. Muell. in Ann. Rep. Brit. N. Guin.* 1894, p. 126.

Without locality.

Polypodium Phymatodes, *Linn.*; *Hook. & Baker*, *Syn. Fil.*, p. 364 ; *F. Muell. Papuan Pl.* i., p. 48 ; *Benth. Fl. Austral.* vii., p. 769.

Neneba, Mount Scratchley, about 4000 ft.

Gymnogramme quinata, *Hook.* ; *Hook. & Baker*, *Syn. Fil.*, p. 387 ; *Becc. Malesia* iii., p. 49.

Vanapa Valley, 2000–4000 ft.

Acrostichum blumeanum, *Hook.* ; *Hook. & Baker*, *Syn. Fil.*, p. 423 ; *Becc. Malesia* iii., p. 51.

Vanapa Valley, 2000–4000 ft.

Acrostichum conforme, *Sw.* ; *Hook. & Baker*, *Syn. Fil.*, p. 401 ; *Benth. Fl. Austral.* vii., p. 778.

Without locality.

Acrostichum spicatum, *Linn.* ; *Hook. & Baker*, *Syn. Fil.*, p. 424 ; *Becc. Malesia* iii., p. 51 ; *Benth. Fl. Austral.* vii., p. 780.

Without locality.

Todea (Leptopteris) alpina, *Baker* ; ad *T. Fraseri*, Hook. et Grev., accedit ; differt frondibus deorsum angustatis, pinnulis profunde pinnatifidis.

Lamina oblongo-lanceolata, 1½–2 ped. longa, medio 8–9 poll. lata, ad basin sensim attenuata, membranacea, nigrescentia, glabra, rhachi nuda ; pinnæ lanceolatæ, sessiles, centrales 4–4½ poll. longæ 1 poll. latæ, rhachi anguste alata, inferiores sensim minores deflexæ ; pinnulæ lanceolatæ, sessiles, erecto-patentes, profunde pinnatifidæ ; segmenta tertiaria linearia, integra, uninervata ; petiolus nudus, brevis. *Sori* pauci, irregulariter sparsi.

Mount Scratchley, 10000–18000 ft.

Marattia fraxinea, *Sm.*, var., **sambucina**, (*Blume*) ; *Hook. & Baker*, *Syn. Fil.*, pp. 440, 441.

Vanapa Valley, 2000–4000 ft.

Ophioglossum pendulum, *Linn.* ; *Hook. & Baker*, *Syn. Fil.*, p. 446.

Vanapa Valley, 2000–4000 ft.

LYCOPODIACEÆ.

Lycopodium cernuum, *Linn.* ; *Baker*, *Fern Allies*, p. 23.

Vanapa Valley, 2000–4000 ft.

Lycopodium Phlegmaria, *Linn.; Baker, Fern Allies*, p. 22.
Locality uncertain.

Lycopodium scariosum, *Forst.; Baker, Fern Allies*, p. 29.
Without locality.

Selaginellaceæ.

Selaginella caulescens, *Spring; Baker, Fern Allies*, p. 94.
Vanapa Valley, 2000–4000 ft.

Selaginella viridangula, *Spring?; Baker, Fern Allies*, p. 92.
Vanapa Valley, 2000–4000 ft.

Selaginella Wallichii, *Spring; Baker, Fern Allies*, 90.
Vanapa Valley, 2000–4000 ft.

Isoetes neoguineenis, *Baker;* ad sectionem *Subaquaticas* pertinet; ad *I. Muelleri*, A. Br., et *I. Kirkii*, A. Br., accedit; differt macrosporis lævibus, velo nullo.

Cormus 3–4-lobus. *Folia* densa, numerosa, atroviridia 2–3 poll. longa, sursum subteretia deorsum applanata, basi abrupte dilatata, stomatibus paucis. *Sporangia* oblonga, brunnea, punctata, velo nullo. *Macrosporæ* globosæ, albæ, inter costas elevatas læves. *Microsporæ* oblongæ, pallide brunneæ, minute tuberculatæ.

Mount Scratchley, 10000–13000 ft.

Musci.

Acanthocladium Armitii, *Broth. & Geheeb in Öfvers. Finsk. Vet.-Soc. Förh. Helsingfors*, lv., p. 100.

Wharton Range, 11100 ft.

Acanthocladium complanatulum, *Broth.* (Hypnum complanatulum, *C. Müll. in Journ. Mus. Godeffroy*, vi., p. 89).

Without locality.

Acrocladium politum, *Mitt. in Journ. Linn. Soc.*, xii., p. 531.

Wharton Range, 11100 ft.

Daltonia Macgregorii, *Broth. in Öfvers. Finsk. Vet.-Soc. Förh. Helsingfors*, lv., p. 95.

Mount Scratchley, 12200 ft.

Ectropothecium (Vesicularia) angustirete, *Broth. in Öfvers. Finsk. Vet.-Soc. Förh. Helsingfors*, lv., p. 96.

Astrolabe Range, 2000 ft.

Ectropothecium laticuspes, *Broth. in Öfvers. Finsk. Vet.-Soc. Förh. Helsingfors*, lv., p. 98.

Without locality.

Ectropothecium longicollum, *Broth. in Öfvers. Finsk. Vet.-Soc. Förh. Helsingfors*, lv., p. 96.

Without locality.

Ectropothecium Macgregorii, *Broth. & Geheeb in Öfvers. Finsk. Vet.-Soc. Förh. Helsingfors*, lv., p. 97.

Without locality.

Ectropothecium tapes, *Broth. in Öfvers. Finsk. Vet.-Soc. Förh. Helsingfors*, lv., p. 98.

Without locality.

Garovaglia Micholitzii, *Broth. in Öfvers. Finsk. Vet.-Soc. Förh. Helsingfors*, lv., p. 92.

Without locality.

Leptostomum intermedium, *Broth. in Öfvers. Finsk. Vet.-Soc. Förh. Helsingfors*, lv., p. 86.

Mount Scratchley, 12200 ft.

Leucophanes Giulianettii, *Broth. in Öfvers. Finsk. Vet.-Soc. Förh. Helsingfors*, lv., p. 72.

Without locality.

Macromitrium macrosporum, *Broth. in Öfvers. Finsk. Vet.-Soc. Förh. Helsingfors*, lv., p. 80.

Mount Scratchley, 12200 ft.

Microthamnium macrocarpum, *Jaeg. Adum.* ii., p. 497.

Mount Scratchley, 12400 ft.

Mniodendron fusco-aciculare, *Broth.* (Hypnodendron fusco-aciculare, *C. Müll. in Uhlworm & Haenl. Bibl. Bot.*, ii., Heft 13, p. 10. t. 8.)

Mount Scratchley, 12400 ft.

Neckera (Nanocarpidium) Giulianettii, *Broth. in Öfvers. Finsk. Vet.-Soc. Förh. Helsingfors*, lv., p. 24.

Without locality.

Papillaria floribunda *C. Müll. in Linnæa*, xl., p. 267.

Without locality.

Pterobryum piliferum, *Broth. & Geheeb in Öfvers. Finsk. Vet.-Soc. Förh. Helsingfors*, lv., p. 93.

Without locality.

Schistomitrium breviapiculatum, *Broth. in Öfvers. Finsk. Vet.-Soc. Förh. Helsingfors*, lv., p. 72.

Without locality.

Schlotheimia Macgregorii, *Broth. in Öfvers. Finsk. Vet.-Soc. Förh. Helsingfors*, lv., p. 82.

Without locality.

Schlotheimia pilicalyx, *Broth. & Geheeb in Öfvers. Finsk. Vet.-Soc. Förh. Helsingfors*, xxxiv., p. 61.

Wharton Range, 11100 ft.

Symblepharis obliqua, *Brotherus* (Holomitrium obliquum, *Salmon in Journ. Linn. Soc.* xxxiii., p. 500) ; species distinctissima, a *S. perichætiali*, Wils., statura robustiore et theca asymmetrica sæpe curvatula facile dignosenda.

Planta robusta, cæspitosa, cæspitibus compactis 3–4 cm. altis ferrugineo-tomentosis lutescentibus. *Caulis* erectus, fere ad apicem tomentosus, dense foliosus, dichotome ramosus, ramis erectis fastigiatis. *Folia* sicca crispata, humida erecto-patentia, e basi oblonga sensim longe lanceolato-subulata, acuta, marginibus erectis integris vel summo apice parcissime denticulatis, nervo basi circa ·15 mm. lato cum apice evanido ; cellulæ incrassatæ, subquadratæ, basilares lineares, alares numerosæ, magnæ, fusco-aureæ, omnes læves. *Bracteæ perichætii* in cylindrum exsertum convolutæ, a basi longe vaginante longe subulatæ, subula subintegra. *Seta* 2 cm. alta, flexuosula, tenuis, lutea vel lutescenti-rubra. *Theca* erecta, asymmetrica, recta vel curvatula, cylindrica, fusca, lævissima ; peristomium simplex ; exostomii dentes 16, per paria approximati, usque ad basin bifidi, cruribus cohærentibus papillosis, purpurei ; operculum e basi conica longe oblique rostratum. *Sporæ* ·017–·020 mm., olivaceæ, papillosæ.

Wharton Range, 11100 ft.

Syrrhopodon adpressus, *Broth. in Öfvers. Finsk. Vet.-Soc. Förh. Helsingfors*, lv., p. 78.

Without locality.

Syrrhopodon croceus, *Mitt. in Journ. Linn. Soc.*, iii., Suppl., p. 41.

Oriomo River.

Tetraplodon mnioides, *Bruch & Schpr. Bryol. Eur.*, t. 289.

Mount Scratchley, 12200 ft.

Thuidium cymbifolium, *Dozy & Molkenb. Bryol. Javan.* ii., p. 115, t. 221.

Without locality.

Thuidium glaucinum, *Bosch & Lac. in Dozy & Molkenb. Bryol. Javan.* ii., p. 117, t. 222.

Without locality.

Trichosteleum hamatum *Jaeg. Adum.* ii., p. 486.

Without locality.

Trichosteleum papillatum, *Paris in Actes Soc. Linn. Bordeaux*, li., p. 349.

Oriomo River.

Zygodon Reinwardtii, *A. Br. in Bryol. Eur.* iii., Zygodon, p. 9.

Without locality.

Hepaticæ.

Cololejeunea hirta, *Steph. sp. n.*

Planta dioica, pusilla, in sicco flavicans, foliis vivis irrepens et subcæspitans. *Caulis* tenuis, divaricatim multiramosus. *Folia* pro planta magna, plana, contigua, recte patula, juniora erecta, falcato-decurva, e basi conico angustata falcato-ovata, i.e. margine antico multo magis arcuato, apice obtusa, dentibus majoribus minoribusque alternantibus irregulariter dentata, dentibus conicis apice papillatim incrassatis. *Cellulæ* folii apicales 17 μ, medianæ 17 × 25 μ, basales 17 × 50 μ, trigonis nullis, antice papilla magna singula centrali ornatæ. *Lobulus* valde inflatus, folio subtriplo brevior, e basi angusta oblongus, carina lævi arcuata levi sinu in folium excurrente apice oblique truncatus, angulo acuto decurvo vix visibili. *Stylus* basalis brevis, unicellularis, cylindricus, facile evanidus. *Perianthia* in pinnis primariis terminalia, uno latere innovata, ex angusta basi oblonga, apice truncato rotundata, plus duplo longiora quam lata, post fructus emissionem fere clavata, medio supero profunde 5-plicata, plicis posticis divergentibus, ad medium perianthii decurrentibus, omnibus conice dentatis, rostro parvo. *Folia floralia* perianthio duplo breviora, anguste spathulata, ut caulina dentata, lobulo duplo angustiore parum soluto et parum breviore, margine integerrimo. Reliqua ignota.

Vanapa Valley, 2000–4000 ft.

Frullania nobilis, *Steph. in Hedwigia*, 1894, p. 154.

Mount Scratchley, 12200 ft.

Herberta Wichuræ, *Steph. in Hedwigia*, 1895, p. 45.

Mount Scratchley, 12200 ft.

Lepidozia Neesii, *Lindenbg. in Gott. Sp. Hepat.*, p. 212.

Mount Scratchley, 12200 ft.

Lophocolea beecheyana, *Tayl. in Hook. Lond. Journ. Bot.*, 1846, p. 365.

Without locality.

Lophocolea ciliolata, *Mitt. in Journ. Linn. Soc.* v., p. 99.

Without locality.

Plagiochila brauniana, *Nees in Lindenbg. & Gott. Sp. Hepat.*, p. 117, t. 24.

Mount Scratchley, 12200 ft.

Thysanolejeunea lanceolata, *Steph. in Hedwigia*, 1896, p. 139.

Vanapa Valley, 2000–4000 ft.

Trachylejeunea Englishii, *Steph. sp. n.*

Planta dioica, minor, fusco-viridis, in filicis fronde repens. *Caulis* pro planta validus, viridis, regulariter pinnatus, pinnulis subbrevibus. *Folia* contigua, subrecte patula, parum concava, late ovata, subacuta, basi antica longe soluta caulique vix incumbentia. *Cellulæ* marginales parvæ (8 μ), irregulariter papilloso-prominulæ ideoque optime crenatæ, medianæ 17 μ, basales 25 × 25 μ, trigonæ minimæ. *Lobulus* bullatim inflatus, folio triplo brevior, carina valde arcuata, in sinu angusto abrupte desinens, e lata basi sensim angustatus, apice oblique truncatus, angulo obtuso, sæpe ad plicam parvam reductus vel omnino nullus. *Amphigastria* caule parum latiora, a caule recte patula, subrotunda, integerrima, transverse inserta ; cellulæ 12 μ, angulares magnæ pellucidæ 17 × 34 μ, trigonis nullis, ad $\frac{1}{2}$ bifida, lobis late conicis acutis. *Perianthia* in ramulis pseudo-lateralia, breviter clavata (plus duplo longiora quam lata), tertio supero quinque-plicata, plicis obtusis, dentibus conicis irregularibus scabra, rostro parvo. *Folia floralia* inæqualia, caulinis similia crenata sed longiora, ex angusta basi obovato-oblonga, acuta, lobulo magno ligulato obtuso folio suo parum breviore et parum soluto ; amphigastrium florale obovatum, ut lobuli integerrimum, ad $\frac{1}{3}$ bifidum, sinu recto-acuto, lobis late conicis acutis. Reliqua desunt.

Vanapa Valley, 2000–4000 ft.

Lichenes.

From Mount Scratchley.

Alectoria ochroleuca *Nyl. Prod. Lich.*, p. 47.

Cetraria sanguinea, *Müll.-Arg. in Journ. Linn. Soc.* xxix., p. 218.

Cladonia sp.

Sphærophoron australe, *Laur.? in Linnæa*, ii., p. 44.

Stereocaulon alpinum, *Laur. ex E. Fries, Lichenogr. Eur.*, p. 204.

Stictina hirsuta, *Nyl. Lich. Scand.*, p. 95.

Stictina multifida, *Nyl. Syn. Lich.*, p. 363, in obs.

DCLIV.—NEW ORCHIDS.—DECADES 23 and 24.

With the exception of the two species of *Vanilla* at the end, the orchids described below are from North-east Celebes, and were collected and presented by Dr. S. H. Koorders, of the Forest Administration of Java. A rough list of orchids is published in

his book entitled : *Verslag eener Botanische Dienstreis door de Minahasa*, pp. 321–326 ; and the localities here given were extracted therefrom ; the same numbers being cited as are attached to the specimens.

221. **Microstylis repens**, *Rolfe ;* ad *M. commelynifolium*, Zoll., accedit, sed foliis subdistantibus longe petiolatis, petalis linearioblongis, et labelli auriculis multo brevioribus differt.

Rhizoma repens. *Folia* longe petiolata ; limbus late ovatus vel cordato-ovatus, acutus, 4–8 lin. longus, 3–7 lin. latus ; petiolus circa 6 lin. longus, margine membranaceus, basi in vaginam tubulosam caulem amplectentem dilatatus. *Scapi* graciles, circa 5 poll. longi ; racemi 1–1¼ poll. longi, laxiflori ; bracteæ ovato-lanceolatæ, acutæ, reflexæ, ¾–1 lin. longæ ; pedicelli graciles, 2–2½ lin. longi. *Sepala* ovato-oblonga, obtusa, 1¼ lin. longa. *Petala* lineari-oblonga, obtusa, 1¼ lin. longa. *Labellum* 1½ lin. longum, subtrilobum, basi biauriculatum ; lobi laterales breves, apice dentibus parvis paucis instructi ; intermedius oblongus, bidentatus ; auriculæ semiovato-oblongæ, obtusæ, ½ lin. longæ. *Columna* ¼ lin. longa.

North-east Celebes. Lokon, Goenoeng Klabat, Minahassa, *Koorders*, 29537.

222. **Microstylis cordifolia**, *Rolfe ;* affinis *M. commelynifoliæ*, Zoll., a qua differt foliis majoribus, petalis oblongo-lanceolatis, labelli lobo intermedio angusto et multo longiore, auriculis multo latioribus.

Rhizoma repens. *Folia* petiolata, limbus late cordatus, acutus vel breviter acuminatus, ¾–1 poll. longus, ½–¾ poll. latus ; petiolus 6–9 poll. longus, basi in vaginam tubulosam caulem amplectentem dilatatus. *Scapi* graciles, circa 9 poll. longi ; racemi 3–4 poll. longi, multiflori ; bracteæ lanceolatæ, acuminatæ, reflexæ, 1–1½ lin. longæ ; pedicelli graciles, 1 lin. longi. *Sepala* ovata, subobtusa vel apiculata, 1–1¼ lin. longa. *Petala* oblongo-lanceolata, subacuta, 1–1¼ lin. longa. *Labellum* 1½ lin. longum, trilobum, basi biauriculatum ; lobi laterales breves, apice profunde fimbriati ; intermedius oblongus, bidentatus ; auriculæ semiovato-triangulares, subobtusæ, ½ lin. longæ. *Columna* ⅓ lin. longa.

North-east Celebes. Lokon, Goenoeng Klabat, Minahassa, *Koorders*, 29539.

223. **Dendrobium (Sarcopodium) parvulum**, *Rolfe ;* species minuta, a D. pusillo, Blume, segmentis acutis et labello non undulato distinguenda.

Rhizoma repens, validum. *Pseudobulbi* sessiles, ovoidei, 2 lin. longi, diphylli. *Folia* sessilia, ovata vel ovato-oblonga, acuta vel apiculata, 3–5-nervia, 3–5 lin. longa, 1½–2½ lin. lata. *Pedicelli* 5 lin. longi, lateraliter acute angulati vel subalati. *Sepalum* posticum ovato-lanceolatum, acutum, 3½ lin. longum ; lateralia subsimilia, leviter falcata, obtuse carinata, basi in mentum oblongum leviter incurvum obtusum extensa. *Petala* oblongo-lanceolata,

acuta, concava, 3 lin. longa. *Labellum* oblongo-lanceolatum, apice acuminatum, recurvum, $3\frac{1}{2}$ lin. longum, margine incurvum; discus tricarinatus. *Columna* $1\frac{1}{4}$ lin. longa. *Mentum* 3 lin. longum.

North-east Celebes. Goenoeng Klabat, Minahassa, *Koorders*, 29565.

Remarkable for its very dwarf habit.

224. **Cirrhopetalum Koordersii**, *Rolfe; C. Thouarsii*, Lindl. simile, sed foliis multo latioribus et petalis obtusis distinctum.

Rhizoma repens, validum. *Pseudobulbi* subdistantes, tetragoni, 1 poll. longi. *Folia* breviter petiolata, elliptico-oblonga, obtusa, $5\frac{1}{2}$ poll. longa, $1\frac{3}{4}$ poll. lata. *Pedicelli* 7 lin. longi. *Sepalum* posticum elliptico-oblongum, obtusum, $3\frac{1}{2}$ lin. longum, margine integrum vel minutissime serrulatum, apice seta filiformi $2\frac{1}{2}$ lin. longa instructum; lateralia supra basin fere ad apicem connata, circa 17 lin. longa, 4 lin. lata, lobis subacutis. *Petala* falcato-oblonga, obtusa, serrulata et longe ciliata, 2 lin. longa. *Columna* lata, $1\frac{1}{2}$ lin. longa, dentes falcato-lineares, acuminati, 1 lin. longi.

North-east Celebes. Oerwoud Totok, Minahassa, *Koorders*, 29566.

Very nearly allied to the Mascarene and Polynesian *C. Thouarsii*, Lindl., though apparently distinct. The specimen is not quite complete.

225. **Eria (Eriura) tricuspidata**, *Rolfe;* ad *E. iridifolium*, Hook. f., accedit, differt foliis angustis, labello lato subæqualiter tricuspidato-trilobo.

Pseudobulbi erecti, teretes, 6 poll. longi vel ultra, polyphylli. *Folia* elongato-linearia, apice obliqua, acuta vel rarius emarginata, $4\frac{1}{2}$–8 poll. longa, 3–7 lin. lata. *Racemi* subterminales, graciles, cinereo-pubescentes, 5–$6\frac{1}{2}$ poll. longi, multiflori; bracteæ late triangulari-ovatæ, apiculatæ, $\frac{3}{4}$ lin. longæ; pedicelli $2\frac{1}{2}$–3 lin. longi, ut flores cinereo-pubescentes. *Sepalum* posticum ovatum, subobtusum, concavum, $1\frac{1}{4}$–$1\frac{1}{2}$ lin. longum; lateralia late ovata, subobtusa, cum basi columnæ in mentum saccatum extensa. *Petala* elliptico-oblonga, apiculata, membranacea, $1\frac{1}{4}$–$1\frac{1}{2}$ lin. longa. *Labellum* $1\frac{1}{4}$–$1\frac{1}{2}$ lin. longum, 2 lin. latum, subæqualiter tricuspidato-trilobum, basi callis 2 oblongis erectis instructum; lobi laterales rotundato-oblongi, obtusi; intermedius apice callo magno obtuso instructus. *Columna* brevissima, in pedem longum extensa. *Mentum* saccato-oblongum, obtusum, 1 lin. longum.

North-east Celebes. Sapoetan Mountains, at 4200–5000 ft., Minahassa, *Koorders*, 29564.

226. **Eria (Hymeneria) celebica**, *Rolfe;* affinis *E. floribundæ*, Lindl., sed racemis et floribus minus pubescentibus et labelli lobis lateralibus angustis dissimilis.

Pseudobulbi subteretes, apice foliati, $4\frac{1}{2}$ poll. longi. *Folia* lanceolata vel oblongo-lanceolata, acuta, 4–7 poll. longa, $\frac{3}{4}$–$1\frac{1}{2}$ poll.

lata. *Racemi* graciles, 5 poll. longi, multiflori, ut pedicelli et flores minutissime puberuli ; bracteæ ovato-oblongæ, acutæ, 1 lin. longæ ; pedicelli graciles, 2 lin. longi. *Sepalum* posticum elliptico-oblongum, subacutum, concavum, $1\frac{1}{2}$-$1\frac{3}{4}$ lin. longum ; lateralia latissime triangularia, obtusa, obliqua, basi cum columnæ pede in mentum oblongum extensum. *Petala* oblonga, obtusa, $1\frac{1}{2}$ lin. longa. *Labellum* $2\frac{1}{4}$–$2\frac{1}{2}$ lin. longum, trilobum ; lobi laterales lineares, subacuti, erecti, $\frac{1}{2}$ lin. longi ; intermedius reflexus, ovatus, obtusus vel emarginatus, convexus, $\frac{3}{4}$ lin. longus ; discus lævis. Columna lata, $\frac{1}{2}$ lin. longa. *Mentum* $1\frac{3}{4}$ lin. longum.

North-east Celebes. Lokon, Goenoeng Klabat, Minahassa, *Koorders*, 29563.

227. **Phreatia Koordersii**, *Rolfe ; P. elegantis* Lindl., similis, differt bracteis brevioribus et floribus minoribus.

Caules abbreviati, circa 6-phylli. *Folia* elongato-linearia, obtusa, $4\frac{1}{2}$–6 poll. longa, 2–3 lin. lata. *Scapus* gracilis, 9 poll. longus, vaginis lanceolatis paucis obtectus ; racemus 4 poll. longus, multiflorus ; bracteæ oblongo-lanceolatæ, acutæ, concavæ, $\frac{3}{4}$ lin. longæ ; pedicelli $\frac{1}{2}$ lin. longi. *Sepala* ovata, obtusa, $\frac{1}{2}$ lin. longa. *Petala* elliptico-ovata, obtusa, sepalis fere duplo minora. *Labellum* sepalis vix longius, basi late unguiculatum, apice flabellato-dilatatum, $\frac{1}{3}$ lin. latum, discus trinervis. *Columna* brevissima.

North-east Celebes. Summit of Mt. Lolomboelan, Minahassa, *Koorders*, 29493.

228. **Phreatia celebica**, *Rolfe ;* species ex affinitate *P. prorepentis*, Reichb. f., a qua differt petalis lanceolato-ovatis, labello flabellato-dilatato.

Rhizoma repens. *Pseudobulbi* ovati, parvi, 3–4 lin. longi, monophylli. *Folia* lineari-lanceolata, obtusa, $2\frac{1}{4}$–3 poll. longa, 3–$3\frac{1}{2}$ lin. lata. *Scapus* gracilis, $4\frac{1}{2}$ poll. longus ; racemus 2 poll. longus, multiflorus ; bracteæ lanceolatæ, acuminatæ, 1–$1\frac{1}{4}$ lin. longæ ; pedicelli 1 lin. longi. *Sepala* lateralia ovata, acuta vel apiculata, $\frac{1}{2}$ lin. longa ; posticum paullo minus. *Petala* lanceolato-ovata, subacuta, sepalo postico subæqualia. *Labellum* $\frac{1}{2}$ lin. longum, basi unguiculatum, apice flabellato-dilatatum, apiculatum, $\frac{1}{2}$ lin. latum ; discus trinervis. *Columna* brevissima.

North-east Celebes. Sapoetan mountains, at 3600 ft., Minahassa, *Koorders*, 29494.

229. **Calanthe celebica**, *Rolfe ;* ad *C. purpuream*, Lindl., accedit, recedit floribus minoribus, labelli lobis lateralibus multo brevioribus, intermedio latiore, et calcare multo breviore.

Folia petiolata, elliptico-oblonga, acuta, puberula, 4–6 poll. longa vel ultra ; petiolus $1\frac{1}{2}$–4 poll. longus. *Scapus* erectus, pubescens, 6 poll. longus vel ultra, pauciflorus ; bracteæ anguste lanceolatæ, acuminatæ, 4–6 lin. longæ ; pedicelli 6–9 lin. longi. *Sepala* ovato-lanceolata, acuta, 6–7 lin. longa. *Petala* elliptico-oblonga, acuta vel apiculata, 5–6 lin. longa. *Labellum* 6–7 lin.

longum, basi columnæ adnatum, trilobum ; lobi laterales auriculati, $\frac{3}{4}$ lin. longi ; intermedius obovato-flabellatus, emarginatus, crenulatus, 4–5 lin. latus ; discus basi trilamellatus, verrucosus ; calcar lineari-clavatum, 6 lin. longum. *Columna* latissima, $1\frac{1}{2}$ lin. longa.

North-east Celebes. Summit of Mt. Masarang, Minahassa, *Koorders*, 29520.

From an old petiole attached to the specimen, it is evident that the leaves and scape may exceed the dimensions given above.

230. **Trichoglottis oblongifolia**, *Rolfe* ; inter species affines foliis oblongis et forma labelli insignis.

Caulis validus, scandens, vaginis striatis verrucosis obtectus. *Folia* oblonga, subæqualiter et brevissime biloba, $2\frac{1}{2}$–$3\frac{1}{2}$ poll. longa, $\frac{3}{4}$–1 poll. lata, lobis obtusis. *Flores* fasciculati ; bracteæ brevissimæ ; pedicelli 6 lin. longi. *Sepala* patentia, obovato-oblonga, obtusa vel apiculata, 6 lin. longa, lateralia pedi columnæ adnata. *Petala* subspathulata, obtusa, 4 lin. longa. *Labellum* 3-lobum, 7 lin. longum, basi concavum, appendiculo lineari villoso $1\frac{1}{2}$ lin. longo instructum ; lobi laterales semiobovati, suberecti ; intermedius basi orbicularis, 3 lin. latus, apice lineari-oblongus. *Columna* lata, brevissima, apice biauriculata ; basi in pedem latum producta ; auriculæ lineari-oblongæ obtusæ, recurvæ, villosæ, $1\frac{3}{4}$ lin. longæ. *Capsula* oblonga, $2\frac{1}{2}$ poll. longa.

North-east Celebes. Near Kajoewatoe, Minahassa, *Koorders*, 29506.

231. **Trichoglottis celebica**, *Rolfe* ; ad præcedentem accedit, sed foliis latioribus et obtusis, floribus majoribus differt.

Caulis elongatus, polyphyllus. *Folia* anguste oblonga, subobtusa, coriacea, 2–$2\frac{3}{4}$ poll. longa, 5–7 lin. lata ; vaginæ striatæ, rugulosæ, 8–10 lin. longæ, apice auriculatæ. *Flores* fasciculati, pauci ; bracteæ desunt ; pedicelli 2 lin. longi. *Sepala* patentia ; posticum oblongum, subobtusum, 3–$3\frac{1}{2}$ lin. longum ; lateralia obovato-oblonga, obtusa, $2\frac{1}{2}$–3 lin. longa. *Petala* oblonga, subobtusa, 3–$3\frac{1}{2}$ lin. longa. *Labellum* $2\frac{1}{2}$ lin. longum, basi saccatum ; lamina glabra, basi angustata, utrinque auriculata, apice triloba ; lobi oblongi vel subdolabriformes, obtusi, laterales subdivaricati, intermedius carnosulus ; calcar saccato-oblongum, obtusum, divaricatum, $1\frac{1}{4}$ lin. longum, postico lamina oblonga obtusa fere $\frac{1}{2}$ lin. longa instructum. *Columna* crassa, 1 lin. longa, angulis alatis.

North-east Celebes. Ranoeketan, Minahassa, *Koorders*, 29505.

232. **Trichoglottis Koordersii**, *Rolfe* ; ex affinitate *T. lanceolariæ*, Blume, sed partibus omnibus duplo majoribus.

Caulis elongatus, polyphyllus. *Folia* oblongo-lanceolata, subacuta, coriacea, 3–4 poll. longa, 4–5 lin. lata ; vaginæ striatæ, 8–9 lin. longæ. *Flores* fasciculati, numerosi ; bracteæ triangulari-ovatæ, subacutæ, minutæ ; pedicelli $1\frac{1}{2}$–2 lin. longi. *Sepalum*

posticum lineari-oblongum, subacutum, 2 lin. longum ; lateralia oblonga, subacuta, bicarinata, $1\frac{3}{4}$ lin. longa, basi pedi columnæ adnata. *Petala* lineari-oblonga, subacuta, 2 lin. longa. *Labellum* $1\frac{3}{4}$ lin. longum, basi saccatum ; lamina glabra, triloba ; lobus intermedius late oblongus, subobtusus ; laterales triangulares, subobtusi, parvi ; discus medio callo carnoso erecto bilobo instructus ; calcar saccato-oblongum, $\frac{1}{2}$ lin. longum, postico callo parvo instructum. *Columna* brevissima.

North-east Celebes. Lolomboelan, and near Totok and Ratatotok, Minahassa, *Koorders*, 29504, 29507.

233. **Vanda celebica**, *Rolfe ;* ad *V. concolorem*, Blume, accedit, recedit labelli lobo intermedio carnoso lateraliter compresso.

Caules breves, polyphylli. *Folia* ligulata, apice inæqualiter biloba, 12–13 poll. longa, 10–12 lin. lata, lobis subobtusis. *Scapus* circa 5 poll. longus, pauciflorus ; bracteæ ovato-oblongæ, obtusæ, concavæ, $1\frac{1}{2}$ lin. longæ ; pedicelli $2\frac{1}{4}$ poll. longi. *Sepala* 10–12 lin. longa, unguiculata ; lamina ovata, obtusa, undulata, 5–7 lin. lata. *Petala* sepalis similia, paullo minora. *Labellum* 5–6 lin. longum, trilobum ; lobi laterales semiovati, obtusi, $2\frac{1}{2}$–3 lin. longi ; intermedius 3–$3\frac{1}{2}$ lin. longus, lateribus omnino compresso-reflexis, basi utrinque dente oblongo reflexo instructus, apice truncatus et lobis 2 oblongis obtusis carnosis erectis instructus ; discus tricarinatus ; calcar conicum, obtusum, compressum, $3\frac{1}{2}$–4 lin. longum. *Columna* 3 lin. longa.

North-east Celebes. Minahassa, without precise locality, *Koorders*, 29502.

234. **Cleisostoma Koordersii**, *Rolfe ; C. latifolio*, Lindl., simile, sed floribus paullo majoribus, labelli lobis lateralibus multo latioribus distinctum.

Caulis abbreviatus. *Folia* approximata, lineari-oblonga, emarginata vel brevissime inæqualiter biloba, 5–6 poll. longa, 11–15 lin. lata, crasso-coriacea. *Inflorescentiæ* pedunculus circa $1\frac{1}{4}$ ped. altus, apice parce ramosus ; rami 1–2 poll. longi, multiflori ; bracteæ late triangulari-ovatæ, subacutæ, divaricatæ, rigidæ, $\frac{1}{2}$ lin. longæ ; pedicelli 4–5 lin. longi. *Sepala* et *petala* obovato-oblonga, obtusa, $2\frac{1}{2}$–3 lin. longa, subpatentia. *Labellum* trilobum ; lobi laterales latissime triangulari-ovati, subobtusi, $\frac{1}{2}$ lin. longi ; intermedius latissime ovatus, subobtusus, recurvus, carnosus, $\frac{1}{2}$ lin. longus ; calcar saccato-oblongum, obtusum, $1\frac{1}{2}$–2 lin. longum ; callus late oblongus, submembranaceus, apice bilobus, $\frac{3}{4}$ lin. longus. *Columna* latissima.

North-east Celebes. Near Ratatotok, and Amoerang, Minahassa, *Koorders*, 29500, 29501.

235. **Tæniophyllum celebicum**, *Rolfe ;* ad *T. obtusum*, Blume, accedit, differt bracteis approximatis nec imbricatis, labello ecalcarato subacuto edentato.

Caulis brevissimus. *Scapi* gracillimi, glabri, 1–$1\frac{3}{4}$ poll. longi ; racemi 3–4 lin. longi ; bracteæ distichæ, approximatæ, squarrosæ,

late ovato-oblongæ, obtusæ, conduplicatæ, subscabridæ, ½ lin. longæ; pedicelli graciles, 2–2¼ lin. longi. *Sepala* et *petala* lineari-lanceolata, subacuta, 1½ lin. longa. *Labellum* ovatum, apice acuminatum et subacutum, 1½ lin. longum, ecallosum, basi concavum, nec saccatum. *Columna* brevissima.

North-east Celebes. Near Kajoewatoe, Minahassa, *Koorders*, 29499.

This species is somewhat anomalous in the genus by reason of the absence of a spur.

236. **Appendicula longipedunculata**, *Rolfe*; *A. cristata*, Blume, proxima, sed foliis elliptico-oblongis, labello ecristato diversa.

Caules subcompressi, elongati. *Folia* elliptico-oblonga, obtusa, 1½–1¾ poll. longa, 6–8 lin. lata. *Pedunculi* elongati, ¾–1 ped. longi, vaginis lanceolatis acutis numerosis obtecti, prope apicem nonnunquam ramosi; racemi multiflori; bracteæ oblongo-lanceolatæ, acuminatæ, 1–1½ lin. longæ; pedicelli 2 lin. longi. *Sepalum* posticum late ovatum, acutum, concavum, 1 lin. longum; lateralia triangulari-ovata, acuta, fere 2 lin. longa. *Petala* late ovata, subacuta, 1 lin. longa. *Labellum* late oblongum, subtrilobum, 1½ lin. longum; lobi laterales brevissimi, rotundati; intermedius quadratus, obscure tridendatus, concavus. *Columna* brevissima. *Mentum* oblongum, obtusum, 1–1¼ lin. longum. *Capsula* oblonga, 5–6 lin. longa.

North-east Celebes. Near Pakoe-oere, Minahassa, *Koorders*, 29495.

237. **Macodes celebica**, *Rolfe*; *M. javanica*, Hook. f., proxima, differt foliis minoribus, labelli lobis lateralibus oblongis multo minoribus, intermedio majore.

Caulis brevis. *Folia* petiolata, ovato-oblonga, apiculata, 1½–2 poll. longa, 10–13 lin. lata; petiolus 5–6 lin. longus, basi in vaginam latam amplexicaulem expansus. *Scapus* deest; pedicelli 4 lin. longi. *Sepala* ovato-oblonga, subobtusa, 3 lin. longa. *Petala* linearia, subobtusa, 3 lin. longa. *Labellum* ample saccatum, trilobum, 3 lin. longum; lobi laterales oblongi, obtusi, ¾ lin. longi; intermedius unguiculatus, orbiculatus, 1¼ lin. longus. *Columna* 1½ lin. longa.

North-east Celebes. Near Kajoewatoe, Minahassa, *Koorders*, 29492.

The Kew specimen is imperfect, one scape only being found in flower, and this is preserved at Buitenzorg.

238. **Peristylus bilobus**, *Rolfe*; ad *P. Brandisii*, Kränzl., accedit, sed foliis duplo brevioribus, labelli calcare clavato-oblongo apice bilobo recedit.

Planta 1¼ ped. alta. *Caulis* infra medium foliatus. *Folia* oblongo-lanceolata, acuta vel acuminata, ½–2 poll. longa, 3–7 lin. lata. *Spica* elongata, angusta, circa 7 lin. longa; bracteæ lanceolatæ, acuminatæ, 2–4 lin. longæ; pedicelli 2–3 lin. longi. *Sepala*

et *petala* erecta, ovato-oblonga, obtusa, 1¼ lin. longa. *Labellum* trilobum, basi latum ; lobi laterales divaricati, filiformes, 2–2½ lin. longi ; intermedius triangularis, subacutus, 1 lin. longus ; calcar clavato-oblongum, 1¼ lin. longum, apice bilobum. *Columna* brevissima.

North-east Celebes. Sapoetan Mountains, Minahassa, *Koorders*, 29489.

239. **Vanilla Hartii**, *Rolfe ;* species distinctissima, ex affinitate *V. Spruceï*, Rolfe, differt foliis brevioribus et floribus minoribus.

Caules subgraciles ; internodia 3½–4½ poll. longa. *Folia* breviter petiolata, ovato-oblonga, acuminata, 2–2½ poll. longa, circa ¾ poll. lata, crassiuscula ; petioli 3 lin. longi. *Racemi* breves, crassiusculi, pauciflori, 5–8 lin. longi ; bracteæ late ovatæ, acutæ, 1½–2 lin. longæ ; pedicelli ¾ poll. longi. *Sepala* oblongo-lanceolata, subobtusa, 1½ poll. longa. *Petala* sepalis paullo angustiora, cætera similia. *Labellum* columnæ fere omnino adnatum, 1¼ poll. longum ; tubus medio angustissimus, basi subinflatus ; limbus cuneato-dilatatus, subinteger, obtusus, crenulatus ; disci venæ paullo incrassatæ, præsertim prope apicem, ibi tuberculis retrorsis paucis instructæ ; crista appendicibus foliaceis denticulatis retrorsis composita. *Columna* gracilis, 1¼ poll. longa.

Trinidad. Cabasterre Arima, *Hart*, 6355.

240. **Vanilla fimbriata**, *Rolfe ;* species ex affinitate *V. ensifoliæ*, Rolfe, sed foliis brevioribus et floribus minoribus.

Caules crassiusculi ; internodia 3–5½ poll. longa. *Folia* breviter petiolata, lanceolata vel lineari-oblonga, acuta vel subacuminata, 2½–5½ poll. longa, 7–11 poll. lata, crassiuscula ; petioli 2–3 lin. longi. *Racemi* crassiusculi, 1–1½ poll. longi, multiflori ; bracteæ ovato-oblongæ, obtusæ, 3–4 lin. longæ ; pedicelli ¾–1¼ poll. longi. *Sepala* et *petala* lineari-lanceolata, subobtusa, 13–15 lin. longa. *Labellum* 12–14 lin. longum, columnæ margine longe adnatum ; tubus angustus ; limbus 5 lin. latus, obtusus, fimbriatus ; disci venæ leviter incrassatæ ; crista carnosa, paullo fimbriata, retrorsa. *Columna* gracilis, 10–11 lin. longa.

British Guiana. Barima River, *Jenman*, 6771.

A very distinct species. The flowers are noted as green outside, whitish green inside, and the lip whitish tinged with yellow in the throat.

MISCELLANEOUS NOTES.

Mr. William Norman Sands, a member of the gardening staff of the Royal Botanic Gardens, has been appointed on the recommendation of Kew, by the Secretary of State for the Colonies, Curator of the Botanic Station in Antigua.

Mr. Murdo McNeill, a member of the gardening staff of the Royal Botanic Gardens, has been appointed on the recommendation of Kew, by the Secretary of State for the Colonies, Agricultural Instructor in St. Vincent.

Mr. Albert John Jordan, a member of the gardening staff of the Royal Botanic Gardens, has been appointed on the recommendation of Kew, by the Secretary of State for the Colonies, Agricultural Instructor in Montserrat.

Botanical Magazine for June.—*Begonia venosa* is a distinct new species discovered by Professor Lofgren, head of the Botanical Department of the State of Sao Paolo, in an island off the coast of North Brazil. Seeds were sent to Mr. Thomas Christy, F.L.S., from whom Kew subsequently received the specimen figured, and a plant which is now growing in the Begonia house. The species, which in several respects resembles *B. incana*, is well characterised by its large transparent stipules. *Morœa sulphurea* is a new species from Cape Colony, whence corms were sent to Kew by Mr. J. Matthews, of Cape Town. In habit it resembles *M. Baurii* and *M. lurida*, having slender stems terminated by a single cluster of flowers. *Kleinia pendula*, native of Arabia, Abyssinia and Somaliland, is a singular plant with cylindric, fleshy branches and stout peduncles, each bearing a single head of bright vermilion coloured flowers. The specimen drawn was sent by Mr. R. T. Lynch, A.L.S., Curator of the Cambridge Botanic Garden. In the collection of living plants at Kew are good specimens, which were received from Mrs. Lort Phillips and the late Mr. J. Theodore Bent. *Chrysanthemum nipponicum* is a compact, vigorous-growing undershrub, with flower-heads much like those of *C. Leucanthemum*. The Kew plant was procured from Messrs. Damman and Co., of Naples. *Iris Delavayi*, from Yunnan, is closely allied to *I. sibirica*. It was obtained at Kew from seeds communicated by M. Micheli, of the Château du Crest, near Geneva, who described the species.

Botanical Magazine for July.—The drawing of the handsome *Yucca Whipplei*, a native of the Rocky Mountains of California, was made from a specimen grown in the gardens of Thomas Hanbury, Esq., at La Mortola. This specimen was raised from seed, and flowered for the first time when nine years old. *Acacia sphærocephala*, from Central America, is an interesting myrmecophilous plant. It is remarkable for its extrafloral nectaries, and for bearing, on the tips of the leaflets, small yellow bodies which are consumed by the ants, the latter inhabiting the large, horn-like stipules. *Masdevallia muscosa*, though a somewhat insignificant plant, is noteworthy on account of its being the only known species possessing a sensitive lip. This springs upwards when touched by an insect, which is entrapped for a time between the lip and the column. The flowers are yellow streaked with

purple. *Crassula pyramidalis* is an exceedingly curious species from the Cape. The Kew plant has a quadrangular stem about 3 inches high, and quite hidden by the leaves, and small, white flowers. *Rosa xanthina* is a native of Central Asia and Afghanistan. In Afghanistan it was discovered by the late Dr. Aitchison, growing in abundance in the Kuram Valley; but, curiously, it has been recorded from no other locality.

Hooker's Icones Plantarum.—The seventh volume of the fourth series (part I., June, 1899), begins with a number of interesting grasses from South Africa and the highlands of British New Guinea. *Guilianettia* (plate 2616), is a new genus of Orchideæ from the latter country, related to *Ceratostylis*. Another interesting orchid is *Catasetum labiatum*, both sexes of which are represented in the same plant. *Moquilea Platypus*, Hemsl., and *Couepia dodecandra*, Hemsl. (plates 2618 to 2621), produce edible fruits, and are native, or cultivated, in the West Indies and Central America. They both belong to the Chrysobalaneæ. This part of the *Icones* also contains a number of novelties from Western China, including *Passiflora Henryi*, *Shortia sinensis*, and *Lespedeza diversifolia*, three noteworthy plants.

Lonicera hildebrandiana.—The first flowering in Europe of this fine species at the Royal Botanic Gardens, Glasnevin, was recorded in the *Kew Bulletin* for last year (p. 317). It has since flowered early in June last in the South Wing of the Temperate House at Kew, and more recently in the Royal Botanic Gardens, Edinburgh.

A gigantic annual.—The growth of many herbaceous plants from seed in a single season is often, as in the *Cucurbitaceæ*, enormous. But in development of stem and branches there is probably no parallel to the case described in the following letter. *Acnida australis* belongs to a small genus of Amarantaceæ confined to North America and Trinidad.

MR. C. H. BAKER TO ROYAL GARDENS, KEW.

Grasmere, P.O., Orange Co.,
DEAR SIR, Florida, U.S.A., November 2, 1897.

THE writer begs leave to address you respecting a matter that he trusts will not prove uninteresting.

He resides in the peninsular portion of the State of Florida, some 20 miles south of the 29th parallel of north latitude, and in the immediate neighbourhood of Lake Opopka, which is third in area of Florida's lakes, and which variously affects a considerable extent of country.

Amongst the plants of the district above specified is *Acnida australis*, Gray, which is, of course, known botanically, appearing briefly characterized in the "Flora of the Southern States," by

Dr. A. W. Chapman, second edition. It is, however, not yet really familiar, has attracted no special attention, and apparently no notice has been taken of the size and development it here attains.

On the 30th October the writer visited a station where it is both abundant and accessible, and measured three individuals, of which he here offers the dimensions, viz. :—

1. Staminate. Circumference at collar 3 ft. 1½ in.—Total height 22 ft. 0 in.
2. Pistillate. Circumference at collar 1 ft. 8 in.—Total height 17 ft. 3 in.
3. Pistillate. Circumference at collar 2 ft. 1½ in.—Total height 22 ft. 6 in.

The above specimens were selected on account of their size, but they are not of maximum height, as the writer observed at least one plant in their neighbourhood which considerably exceeded them but which it was not practicable to measure on account of treacherous footing. He is, moreover, well satisfied that greater size is attained, since he has seen the base of a plant, cut off by another person, which was 15 in. in diameter at about 1 ft. above the collar, and certainly 18 to 20 in. in diameter at the collar itself. Besides, he has himself measured a dry and broken stem of a previous season's growth that was 21 ft. 10 in. in height. He is, therefore, quite satisfied that this plant reaches the height of 25 ft. in this neighbourhood, while, since it is found further south, it may grow still taller. "Thirty feet high and as big as a barrel" is a phrase he has heard used in characterizing it, from which some discount must probably be allowed. The average of the multitude of plants in sight must be between 12 and 15 ft. and the extent of their branches from 4 ft. in the case of slender specimens, to 10 ft. or more for the larger ones.

The site occupied by the Acnidas is a considerable depression amongst sandy and timbered hills, sinuous in plan and communicating with, really forming a part of, the basin of Lake Apopka, the water-level of which within a few years was continuous on it. The water has now receded owing to lack of rainfall and to the partial reclamation of the marsh-lands adjacent to the lake leaving the depression in a boggy condition, filled as it is with the débris of the former aquatic growth, which consisted of *Pontederia*, *Sagittaria*, *Nuphar*, *Cladium*, &c., augmented considerably by that of *Acnida* itself, forming a muck, or vegetable mud, of a spongy consistence from 3 ft. in depth downward.

In this soil the *Acnida* seems to meet with its most favourable conditions, its central or tap root tapering abruptly and usually bending into a right angle about a foot below the surface, while its lateral roots radiate from the collar and make their way downwards at a slight angle to a distance of 3 ft. or more, their function being to some extent that of affording anchorage. The base of the trunk is dilated to four or five times its average thickness into which it tapers some 2 or 3 ft. above the base. The trunk itself is columnar, and hollow from the base upwards to the apical growth, strongly thickened within and without into distinct nodes from which the branches grow.

In the measured dry stem, or trunk, already mentioned, a woodpecker had chiselled a hole 1½ in. in diameter at a height of 8 ft. 9 in. from the ground in order to make its nest.

The trunks are usually quite straight but stand considerably out of the vertical. The pistillate plants appear to be the more robust, their lower limbs or branches sustain the weight of a heavy man climbing up into them. Their bases, and the bases of their limbs, are dark crimson in colour ; the leaves in spring and summer are abundant, shining, and of a rich green, so that although the plant is rather coarse it has much the same effect, in the case of a well-grown individual, as a clump of the smaller bamboos.

The *Acnida* makes most of its growth from May to August, ripening its fruit variously in September and October. The writer has pleasure in forwarding with this communication some fruiting shoots of the largest specimen, exhibiting its utricles and seeds, of which, in consideration of such interest as they may possess, he begs your acceptance for Kew.

Early last spring he sowed seeds of various Amaranths with coloured foliage amongst young plants of *Acnida*, hoping thus to foster the natural production of hybrids with similar foliage ; the experiment however seems not to have succeeded thus far.

The species herein mentioned is noted as *Acnida australis*, such is the reference last made by Dr. Chapman and as such it probably appears in the new edition of his Flora. There are most likely two species attaining unusual size, the other having interrupted flower-spikes, while in the case of that particularly noted they are very close or cylindrical.

The writer is interested in inquiring as to some of the annuals from other countries that approach, or exceed, this in size, and should be greatly obliged for whatever information may be, at any suitable or convenient opportunity, imparted on the subject. He is, of course, familiar with our taller American annuals and with those of similar character already introduced into cultivation elsewhere ; and asking your indulgence for the length of this, remains,

Your obedient servant,
(Signed) CHARLES HENRY BAKER.

W. T. Thiselton-Dyer, Esq.,
Royal Gardens, Kew.

In order to test these statements some of the seed was sown in heat at Kew, in February, 1898. The plants raised were put out in ordinary garden soil in the open air in June. In October the largest plant had attained the following dimensions :—Height, 10 ft. ; diameter of stem at base, 7 in. ; branches near base, 5 ft. long, 1½ in. diameter ; leaves, including petiole, 14 in. long, 3 in. wide. A slight frost then killed all the leaves and the ends of the branches.

Uganda Clover.—Mr. Alexander Whyte, F.L.S., Curator of the Botanic Station, Uganda, has sent to Kew a supply of seed of a clover which Mr. Scott Elliot found common at Kikuya, at 5–6,000 ft. It was originally discovered by Sir Harry Johnston

on Kilima N'jaro, at 10,000 ft., in 1885, and was described by Prof. Oliver (*Trans. Linn. Soc. Bot.*, 2nd ser., vol. ii., p. 331) as *Trifolium Johnstoni*. It is a near ally of the widely dispersed *Trifolium repens*, which it closely resembles. Mr. Whyte wrote:—"The rich trefoil of clover growing in the marvellously fattening pastures of Kikuya. A splendid plant to introduce into hill pastures of other tropical countries." Seeds have been distributed for trial in the Colonies and elsewhere.

Penguins.—Mr. Albert Linney, the Head Gardener at Government House in the Falkland Islands, who was formerly in the employ of Kew, has, on recently returning home on leave, brought with him three Penguins for the collection of aquatic birds in the Royal Botanic Gardens. Two were specimens of *Aptenodytes papua* and the third, the smaller (since dead), is *Sphenisicus magellanicus*.

Use of Orchid-bark for Ornament.—In some "Notes on Orchids in the Jungle" (*Orchid Review*, 1893, vol. I., p. 82), the late Major-General E. S. Berkeley described the use of the "fibre" of *Dendrobium secundum* for making the string or "connector" with which the aborigines of N. Andaman attach the head to the shaft of their arrows. The employment of orchids for any useful purpose is rare, and the present seemed so exceptional that application was made to Mr. E. H. Man, C.S.I., Deputy Superintendent of the Andamans, for specimens illustrating it for the Kew Museum.

Mr. Man very kindly forwarded to Kew an interesting letter (dated December 6, 1893), from Mr. M. V. Portman, Officer-in-Charge of the Andamanese, which corrected General Berkeley's account in many particulars :—

"The connector attaching the head to the shaft of the 'Éla,' the arrow used for shooting pig, is made of the fibre of *Anodendron paniculatum* ('Yólba'), and orchid bark is never used in its manufacture.

"Orchid bark (Rá) is, however, worked into the Yólba fibre binding the heads of the fish arrow (Táulbod), and also in the head of the Éla, but as an ornament only, owing to its bright yellow colour. It is prepared as follows :—The orchid is roasted over embers, until the bark becomes of a straw colour, and the bark is then stripped off by a shell-knife. It is very brittle, owing to the baking it has received, has no toughness at any time, and is absolutely valueless commercially."

Mr. Man has been good enough to send to Kew an interesting series of objects consisting of bracelets, armlets, a waist-belt, and head ornament, made of shells fastened to a coarse cord which is covered with the bright yellow skin or bark exactly corresponding with that which covers the pseudobulbs of *Dendrobium secundum*.

In a farther letter, dated June 18, 1894, Mr. M. V. Portman says :—"The Öngés of the Little Andaman Island make more use of the bark than the aborigines of the Great Andaman, their

ornaments being composed of it . . . The people of the western tribe of Torres Straits, who in their customs greatly resemble the Andamanese, make a similar use of orchid bark; specimens are probably in the British Museum. (See a paper by Professor A. C. Haddon in the *Journal of the Anthropological Institute*, November 26, 1889, pp. 385, 386)."

New Products from the Upper Congo.—Through the kindness of M. Emile Laurent, Professor of Botany at the State Institute of Agriculture, Gembloux, Belgium, the Kew Museum has received an interesting series of samples of caoutchouc obtained from species of *Landolphia* growing in the Belgian possessions on the Upper Congo. Several of the forms in which they are prepared are such as are not seen in English commerce, and one sample, prepared in block form, is of remarkably fine quality, being singularly free from impurities, and equalling in appearance fine Para rubber.

In a note accompanying the samples Professor Laurent says that the juice of *Costus lucanasianus* is used to coagulate the rubber. Accompanying these specimens is also a section of a stem of a new copal yielding tree with the resin *in situ*, together with some separate lumps. In appearance this resin comes nearest to that of Inhambane copal from *Copaifera gorskiana*, Benth., samples of which were received and reported upon by Messrs. R. Ingham, Clark & Co., in 1888 (*Kew Bulletin*, 1888, pp. 281–83). It also has some resemblance to Ogea gum, the produce of a tree of the Gold Coast, and supposed to be a species of *Daniellia*.

The plant yielding this newly discovered copal from the Congo has been named *Trachylobium dewevrianum*.

A sample of this new copal has been submitted to Messrs. R. Ingham, Clark & Co., who report upon it, under date August 10th, 1897, as follows :—

"We have had the sample of gum tested at the works. In appearance it resembles Accra, but we think it a very recent gum. It has a melting point of about 300°–320°, ignites very freely under heat, and is extremely 'stringy' when melting, which is not a good point, and in this respect it resembles soft Manila.

"We attribute it, however, to the sample being, as we say, of recent exudation, and probably much older and harder qualities can be found below the surface of the ground.

"The commercial value would be about £40 per ton. It is, however, impossible to judge the value of a 'find' of this kind without having a considerable bulk sample."

Hibiscus lunariifolius.—In a despatch to the Secretary of State, dated Feb. 25, 1899, Mr. Low, the Acting Governor of the Gold Coast, stated that the Curator of the Botanic Station was "preparing some specimens of a fibre which he has procured from a long twig-like tree by soaking the twigs in water and then removing the outer covering." He added :—"He will prepare and take

to England samples of this fibre. The tree grows about two days journey from Aburi." The plant yielding the fibre has been identified as *Hibiscus lunariifolius*. Kew is indebted to Messrs. Ide and Christie for the following report upon the commercial value of the fibre :—

MESSRS. IDE AND CHRISTIE TO ROYAL GARDENS, KEW.

72, Mark Lane, London, E.C.

DEAR SIR,

Your favour of the 16th and samples to hand.

Hibiscus lunariifolius.—This is a Jute, good colour, and hard, similar to that received from China; will sell freely at £12 to £13 per ton.

Yours faithfully,
(Signed) IDE & CHRISTIE.

SPORES OF TILLETIA.

E. Weller & Grahams Ltd Litho. London. 7914 7.99